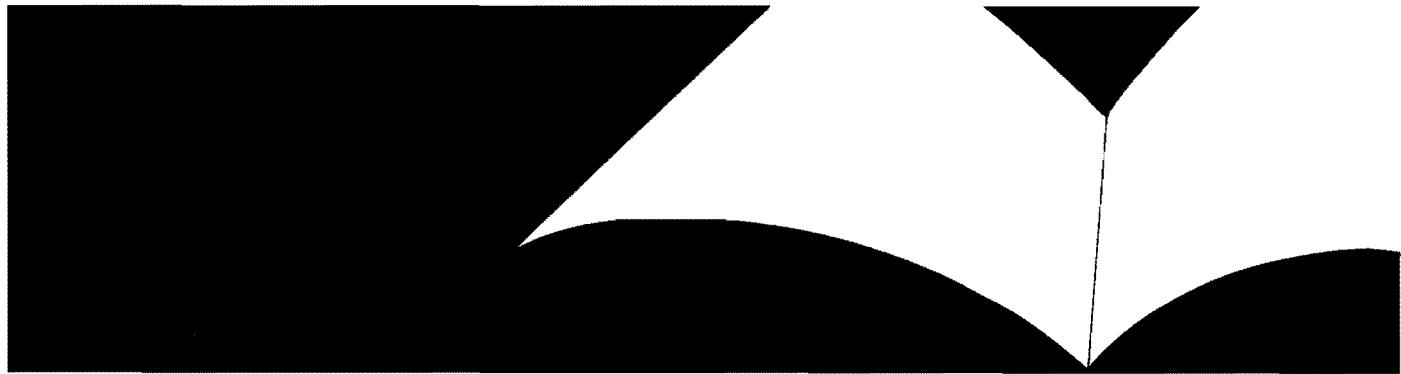


**BUDGET
ISSUE PAPER**



**Planning U.S.
General Purpose Forces:
The Navy**

December
1976



Congressional Budget Office
Congress of the United States
Washington, D.C.

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THE NAVY

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NOTE

The following shipbuilding and conversion (SCN) index was used throughout the text to obtain constant fiscal year 1977 dollars:

1976	90.09
1977	100.00
1978	112.30
1979	119.71
1980	127.37
1981	135.53

As the Congress makes decisions on budget targets for the First Concurrent Resolution on the Budget for Fiscal Year 1978, the appropriate size of the defense budget will be one of the most important issues. The military forces which that budget buys can be divided into two parts: the strategic retaliatory forces--inter-continental missiles and bombers and submarine-launched ballistic missiles; and the general purpose forces--all the rest of the Navy, Army, Air Force, and Marine Corps. The general purpose forces account for most of the defense budget, and decisions about their size, location, equipment, and level of readiness determine much of the defense budget. The appropriate character and size of these forces, in turn, is tied to conceptions of how and where they would be used and assessments of the capability of likely adversaries.

The series of Budget Issue Papers of which this is a part is intended to lay out the most important assumptions underlying current planning of the general purpose forces, discuss the match between those assumptions and the current or projected forces, and suggest what might change in defense programs if somewhat different planning assumptions were adopted. The other papers in the series are: Overview, Army Procurement Issues, Tactical Air Forces, Theater Nuclear Forces, and Forces Related to Asia.

This paper was prepared by Dov S. Zakheim of the National Security and International Affairs Division of the Congressional Budget Office, under the supervision of Robert B. Pirie, Jr. and John E. Koehler. The author wishes to acknowledge the assistance of Patrick L. Renahan and Robert E. Schafer of the CBO Budget Analysis Division, Kendrick W. Wentzel of the Natural Resources and Commerce Division, and Edwin A. Deagle, Jr., formerly Executive Assistant to the Director. The paper was edited by Patricia W. Johnston, and Patricia Edwards typed the several drafts.

Alice M. Rivlin
Director

December 20, 1976

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SUMMARY

The present fiscal year will witness the first increase in Navy general purpose force levels in over a decade. If Congress elects to fund further increases in the Navy's force levels for the 1980s, it will face choices concerning the mix of warships that should be added to the fleet. Decisions about this mix in turn will depend on assessments of the relative importance of the Navy's two major missions: sea control, the ability to keep the sealanes open to friendly shipping; and power projection, the capability of exerting sea-based military force against objectives on the shore. These missions may be called for in a variety of military contingencies, but the most exacting one, calling for naval forces that should also be able to accomplish other missions with less effort, is that of United States participation in a European conflict between NATO and the Soviet Union. The fundamental issue is whether the United States wishes to buy naval forces designed to approach and attack the USSR or its allies in the face of heavy defenses, or whether we wish instead to concentrate effort on ensuring that we can keep the sealanes open against Soviet opposition.

A general purpose fleet geared primarily to sea control would forego any attempt at power projection against the Soviet Union. It would depend primarily on the capability of U.S. antisubmarine forces to defeat the Soviet submarine force, which is the main threat to our control of the sealanes. Other U.S. naval forces would be used primarily to support and defend the antisubmarine forces. While retaining and using combat vessels currently in the fleet, further procurement of major projection oriented warships such as carriers, strike cruisers, and large destroyers would not be needed; vessels like these are not designed mainly for use against submarines. Since these warships are extremely expensive to buy--\$1.44 billion (fiscal year 1977 dollars) for an aircraft

carrier, \$1.1 billion for an AEGIS strike cruiser, \$858 million for a DDG-47 AEGIS destroyer--the sea control option would avoid significant procurement costs.

A "power projection" Navy would, on the other hand, stress the procurement of carriers and supporting vessels to attack land-based military objectives. A program geared to enhancing significantly the Navy's capability to perform this mission would call for the procurement of three aircraft carriers, six AEGIS-carrying strike cruisers, and fourteen DD-963 destroyers in the fiscal year period 1978-82. The cost of these ships alone would approximate \$13.5 billion (fiscal year 1977 dollars). This sum represents about 50 percent of the Administration's initial \$28 billion fiscal year 1977 five-year naval construction program for 111 ships, including support and replenishment vessels.

Lastly, a fleet that would maintain the present balance of naval sea control and projection capabilities would require smaller increments to the projection force. Only one carrier, two AEGIS strike cruisers, and eight conventionally powered DDG-47 destroyers would be procured in the five-year period of fiscal years 1978-82, at a cost of \$7.1 billion for the 11 ships. A variant of this program, which would aim at a similar balance but with lower costs incurred, would call for the backfitting of AEGIS onto four nuclear-powered cruisers in place of the procurement of two new strike cruisers. The cost of this variant would be \$6.4 billion (fiscal year 1977 dollars).

The relative importance to the European scenario of the projection mission and the sea control mission is very much a function of assumptions about the type of war that is likely to develop, and about the nature of Soviet military capabilities. Neither mission would be crucial to the Allied effort if the land battle is fought with nuclear weapons, or if a conventional war is over before sea-based replenishment becomes relevant. Sea control, which calls for the containment of air, surface ship, and submarine threats to convoy shipping,

becomes more critical as the war's duration increases. In that environment, convoy shipping and resupply of forces and allies take on considerable importance. Power projection, on the other hand, appears to be a less feasible task. Naval forces approaching the USSR would increasingly become absorbed in self-defense as they come within range of Soviet land-based air forces. There are serious doubts that even self-defense would be successful, given the intensity of attacks that Soviet short- and medium-range defenses can mount. Finally, attack of such Soviet targets as can be reached from the sea would not be likely to affect the outcome of the war in Central Europe significantly.

The eastern Mediterranean represents a special case of the European scenario because the USSR has deployed a permanent naval squadron there. The proximity of Soviet ships to the U.S. Sixth Fleet embodies an ongoing threat of surprise saturation attack on carrier task forces. However, it is unlikely that the Soviets could effectively bring their long- and medium-range bomber forces to bear as part of such an attack. Additionally, it is equally unlikely that U.S. forces would not have any warning of its imminence. They might even be able to withdraw to the western Mediterranean, out of reach of all Soviet land-based aviation. Sea control is possible over the long term in the Mediterranean, as it is in the Atlantic; power projection would be difficult in both theaters.

A "sea control" Navy would seek to project power only in low-threat Third World scenarios; because the current fleet retains 12 carriers, it would not require further carrier construction. AEGIS, an air defense system presently geared to protecting carriers in high-threat environments, would also not be required for this Navy. The funds freed by the decision not to procure these major systems would exceed \$7.0 billion (fiscal year 1977 dollars) for the fiscal years 1978-82 period, given the Administration's announced intention to procure at least one Nimitz-sized carrier, two AEGIS

strike cruisers, and eight conventional AEGIS destroyers. These funds could be utilized to buy antisubmarine and other sea control systems or for other purposes.

If a "power projection" Navy were desired, however, the demanding nature of the projection mission against the Soviet Union would require a significant increase in attack carrier procurement. Carriers could be procured every second year: three would be funded in the five-year period of fiscal years 1978-82. AEGIS would be a necessary addition to task force defenses. Strike cruisers might usefully supplement the carrier's projection role in Third World scenarios, and could be procured as the sole type of AEGIS platform. Six strike cruisers could be funded between fiscal years 1978 and 1982, with three more receiving advanced funding. Fourteen DD-963 destroyers would also have to be procured to round out the escort requirements of each new carrier task force. As noted above, the five-year 1978-82 cost of procuring just these systems alone would exceed \$13 billion (fiscal year 1977 dollars).

It may be argued that the demands of the projection mission have been overstated. In this view, Soviet defenses can be penetrated by approximately present levels of naval strike forces if they are augmented by more advanced missile defense systems than they presently have. This, in essence, is the fundamental assumption behind the tentative National Security Council proposal for one more carrier and a mix of eight conventional and two nuclear AEGIS platforms for fiscal years 1978-82. The additional carrier is meant to ensure that the present 12-carrier force remains intact into the foreseeable future, despite the advanced age of part of that force. The AEGIS ships are required to provide antimissile defenses for the task forces. Unless the assumption about the sufficiency of present naval levels for both sea control and projection

missions in Europe is accepted, however, the NSC proposal is not cost/effective. It provides superfluous offensive assets for sea control requirements and too few for successful pursuit of the projection mission. As noted above, the cost of these systems, if procured in the quantities that NSC recommends, would be \$7.12 billion (fiscal year 1977 dollars; see Table S-1). A variant of this option would backfit AEGIS onto four Virginia-class nuclear-powered cruisers, providing some mix of nuclear and conventional AEGIS ships at a lower cost. The five-year systems cost of this variant, with carrier costs included, would amount to \$6.44 billion (fiscal year 1977 dollars).

Table S-1. Alternative Shipbuilding Programs for Carriers, Cruisers, and Destroyers, Fiscal Years 1978-1982, in Billions of Dollars

Program	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980		Fiscal Year 1981		Fiscal Year 1982		Total Ships	Total
	No./Type	Cost	No./Type	Cost	No./Type	Cost	No./Type	Cost	No./Type	Cost		
Sea Control	--	--	--	--	--	--	--	--	--	--	--	--
Projection	1 CVN	\$1.09	1 CVN (adv.)	\$.36	1 CVN	\$1.08	1 CVN (adv.)	\$.36	1 CVN	\$1.08	3 CVN	\$ 3.97
	3 CSGN (adv.)	\$.30	2 CSGN	\$1.81	1 CSGN	\$.86	2 CSGN	\$1.72	1 CSGN	\$.86	6 CSGN	\$ 6.22
	4 DDG-963	\$.94	CSGN (adv.)	\$.07	2 CSGN (adv.)	\$.20	1 CSGN (adv.)	\$.10	3 CSGN (adv.)	\$.30		
	3 DD-963	\$.70	2 DD-963	\$.47	3 DD-963	\$.70	2 DD-963	\$.47	14 DD-963 ^a	\$ 3.28		
Total	5 Ships	\$2.33	5 Ships	\$2.94	4 Ships	\$2.61	5 Ships	\$2.88	4 Ships	\$2.71	23 Ships	\$13.47
NSC Option	1 CVN	\$1.08	--	--	--	--	--	--	--	--	1 CVN	\$ 1.08
	1 CSGN (adv.)	\$.17	1 CSGN	\$.95	1 CSGN (adv.)	\$.07	1 CSGN (adv.)	\$.16	1 CSGN	\$.73	2 CSGN	\$ 2.08
	1 DDG-47	\$.74	--	--	2 DDG-47	\$.92	3 DDG-47	\$1.38	2 DDG-47	\$.92	8 DDG-47	\$ 3.96
Total	2 Ships	\$1.99	1 Ship	\$.95	2 Ships	\$.99	3 Ships	\$1.54	3 Ships	\$1.65	11 Ships	\$ 7.12
NSC Variant	1 CVN	\$1.08	--	--	--	--	--	--	--	--	1 CVN	\$ 1.08
	1 AEGIS	3 AEGIS										
	BACKFIT	\$.35	BACKFITS	\$1.05	--	--	--	--	--	--	4 AEGIS	\$ 1.40
	1 DDG-47	\$.74	--	--	2 DDG-47	\$.92	3 DDG-47	\$1.38	2 DDG-47	\$.92	8 DDG-47	\$ 3.96
Total	2 Ships	\$2.17	- Ships	\$1.05	2 Ships	\$.92	3 Ships	\$1.38	2 Ships	\$.92	9 Ships	\$ 6.44

Note: The cost of the Service Life Extension program for carriers (SLEP) has not been included in any option, because of present uncertainties regarding cost projections.

Note on Program Phasing: The flow of the "NSC Option" five-year program is virtually identical to that which the Administration put forward for fiscal years 1977-81. It reflects an effort to smooth the variations in annual shipbuilding authorizations. The "projection Navy" and "NSC Variant" programs represent a similar principle. Shipyard capacity also influenced the number of nuclear ships proposed for each year's construction program (see text). No such restrictions affected the choice of DD-963 numbers for ship construction. As many as six of these ships have been authorized for one year, to be built at one yard. The size of the annual DD-963 programs was instead geared to overall considerations of annual SCN cost variances.

a. Because DD-963 lead time is shorter than that of an aircraft carrier, 16 destroyers can be authorized over a six fiscal year period and be completed in time to commence active service with the three carriers authorized in the five-year period fiscal years 1978-82.

CHAPTER I INTRODUCTION

Each year, the Navy prefaces its budget requests to the Congress with a discussion of the missions its forces are supposed to perform. It states that its proposed annual marginal changes to those forces, which constitute its budget and five-year plan, seek to enhance its ability to perform its missions. The missions, in turn, are presented as deriving from the national defense strategy and planning as formulated by the Secretary of Defense in consultation with the Joint Chiefs of Staff. Changes in the forces thus are programmed to be consistent with both plans and mission requirements and to be designed to fulfill them rationally.

This paper will address the relationship between plans, missions, and forces and relate it to alternate naval force mixes that would reflect different mission priorities. In framing these alternatives, the paper will focus on three major and expensive new systems that the Navy will request in fiscal year 1978 to improve the fleet's ability to perform its missions. These systems, all of which relate to the carrier task force concept, are:

- 1) The CVN-71, the aircraft carrier to follow the Nimitz-class, for which Congress appropriated \$350 million for fiscal year 1977.
- 2) The new AEGIS ship, both nuclear and non-nuclear versions of which have failed to win Congressional approval.
- 3) The AEGIS air defense system itself.

FORMAT

The paper posits that the primary determinant of medium- and long-range U.S. force requirements is the Department of Defense (DoD) "Case I" scenario of worldwide war with the Soviet Union focusing on the European

theater. Case I generally encompasses the force sizing requirements of all other contingencies; war with the Soviet Union in Europe would make the greatest demands on U.S. resources. 1/ To be sure, there are residual exceptions to the requirements of this European scenario. Thus both DoD and the Navy stress requirements that are earmarked for a future Pacific contingency that may or may not be linked to a European war. Nevertheless, the primary thrust of both DoD and Navy planning clearly addresses the requirements of an Atlantic/Mediterranean contingency; 2/ and this paper adopts that perspective.

The paper will first consider the Navy's missions, and will highlight the assumptions underlying the Case I scenario that support the derivation of force plans from them. It will seek to establish the relationship between present forces, notably carrier-related forces, and the missions they are meant to carry out within the Case I context.

The paper will then address alternative naval postures for the mid-to-late 1980s that best reflect differing mission priorities. In doing so it will focus on fiscal years 1978-82 budget proposals relating to carrier task forces in terms of their relative costs and their relevance both to the Navy's stated missions and the proposed alternative force postures.

1. See Donald H. Rumsfeld, Report to the Congress on the Fiscal Year 1977 Budget and its Implications for the Fiscal Year 1978 Authorization Request and the Fiscal Year 1977-81 Defense Programs (January 27, 1976), pp. 115-116.

2. See testimony of Admiral James L. Holloway III before the Subcommittee on the Department of Defense of the House Appropriations Committee, Hearings: Department of Defense Appropriations for 1977, Part 8, 94-2, 1976, p. 246. Admiral Holloway pointed out that today the U.S. Navy holds a margin of superiority over the Soviet Union "in those scenarios involving our most vital national interests." He did not include the western Pacific in this category, stating that "we would have difficulty projecting our sea lines of communication" into that area (Ibid., p. 109).

CHAPTER II RELATING MISSIONS TO STRATEGY AND SCENARIOS

OVERVIEW OF THE NAVY'S MAJOR WARTIME MISSIONS

The Navy pursues two major wartime missions within the overall national forward defense strategy: sea control and power projection. Sea control encompasses the Navy's tasks of protecting sea lines of communication between the U.S. and her overseas forces and Allies and of carrying materiel and manpower to overseas forces. It connotes the Navy's ability to support the relatively unimpeded transit of friendly shipping across selected sealanes, to conduct relatively uninhibited sea-based operations in given sectors, and to deny the enemy the ability to pursue similar operations in those areas. In carrying out sea control, the Navy must reduce enemy submarine activity to a level that will not seriously inhibit the transit of men and materiel. It must also prevent enemy surface ships and air forces from significantly disrupting the movement of friendly forces at sea.

Power projection in conventional warfare 1/ connotes the Navy's ability to launch sea-based air and ground attacks against enemy targets onshore. It also involves naval gun bombardment of enemy naval forces at port and installations. 2/ It is meant to enhance the efforts of U.S and Allied land-based forces in achieving their objectives.

Both missions apply at all times, in all situations, and to all geographic areas which the National Command Authority deems vital to American security. The scenario in which these missions are meant to be carried out,

1. Navy ballistic missile submarines (SSBN) have a strategic power projection mission. This paper does not address strategic nuclear war or weapons systems.
2. Present (1977) naval resources in this area are extremely limited.

however, affects their importance to the war effort as a whole as well as to each other. Our naval forces, like all U.S. forces, are sized primarily with a view to coping with the Soviet threat in a European/ NATO war that could spread world wide. These forces could also serve in other scenarios, such as conflicts involving Third World states where the Soviet Union is not a participant. This paper will address naval missions primarily in terms of their importance to the major force sizing scenario, that of a European conflict with the Soviet Union. In the context of a war in Europe, the relative importance of the sea control and power projection missions to national strategy critically depends upon two factors. The first is the level of conflict: whether the war involves the use of nuclear weapons. The second is the relationship between the length of a war in Europe and the time required to establish control of the Atlantic sea lanes.

SEA CONTROL IN A EUROPEAN CONFLICT

The Navy's sea control mission assumes its greatest importance in an extended, conventional European war. In that situation there is a need for seaborne reinforcement and replenishment of forces, and the opportunity exists to win control of the sealanes. On the other hand, if the war immediately reaches the nuclear threshold, even if nuclear weapons are confined to the immediate theater, and certainly if they are not, sea control becomes a subsidiary concern. The destruction of men and materiel, and consequent shortages of supply, may well be so great as to be beyond the capacity of convoys to replenish, particularly if they were subject to nuclear attack as well. There certainly are enough nuclear weapons in the European theater, and potentially aboard both Soviet and American warships, to assure that destruction.

Sea control, while still important, may be less so if the war is a short one--a lightning conflict of a few days or weeks. Such an outcome could result from the fact that both sides employ nuclear weapons, or from the collapse of forces on either or both sides, or from a negotiated settlement. In these cases convoys would make less difference to Allied success than they would in a longer war. The time required to mount convoys in

the United States is indifferent to the level of war fought on another continent. Ships must be located, in port or at sea, and redirected to designated ports. Supplies must be rerouted to those ports and distributed among the convoys. The process is time-consuming even if all schedules are met. Convoys may not reach Europe in substantial numbers until the third week of war, even if they began to be formed in a period of tension, before war broke out, and if they encountered no hostile forces when crossing the Atlantic. ^{3/} Of course, if hostile forces were encountered in early convoy movements, sea control forces would reduce losses to those convoys although they would in any case to be great. Material delivered by sea in the first few weeks of the war would clearly be very useful to NATO forces. Given the uncertainty about when convoys would arrive, however, and how much they would deliver, present planning places primary emphasis on prepositioning and airlift for NATO's initial defense.

ASW: A Time-Consuming Process

The importance attached to antisubmarine warfare (ASW) depends on how fast it can produce results, and when one expects to reach very high levels of reinforcement shipping. Sea control, as defined above, calls for reduction of air and surface, as well as submarine, threats to levels that permit significant transit of men and supplies across sealanes. As will be shown in the following sections, ^{4/} air and surface threats can be overcome in the early stages of a European conflict. On the other hand, the Soviet submarine threat is the primary and most persistent obstacle to Allied control of the sea lanes. ^{5/} Complete neutralization of that threat is a time-consuming effort.

3. Reply of Admiral James L. Holloway III to written questions of Chairman McClellan, in Senate Committee on Appropriations, Hearings: Department of Defense Appropriations, Fiscal Year 1976, Part 3, 94-1, 1975, p. 197.

4. See below, pp. 24-26.

5. See, for example, the statement of Vice Admiral Daniel Murphy before the Research and Development Subcommittee of the Senate Armed Services Committee, Hearings on S.2965, 94-2, 1975, p. 1943.

Antisubmarine warfare is a process of attrition. To be sure, Allied forces can actively seek out and destroy submarines; they need not merely await submarine attacks on convoys and then retaliate. Nevertheless, the hunt/kill process involves detection and precise location of the submarine before an attempt at destruction is possible. Navy studies show that, even if active antisubmarine tactics are initiated immediately at the outbreak of war, there is no practicable way to accelerate the attrition process appreciably. For example, submarine barriers could be established at or near the start of hostilities, but their effectiveness would depend on the number of times enemy submarines sought to transit them. The severe submarine threat could not be significantly reduced in the early weeks of war. The sea control mission, which involves reduction of that very threat, therefore cannot be completely executed even if it is begun immediately, unless and until the war extends past those first weeks.

Sea Control Crucial in Extended Conflict and a Critical Hedge Against Early Defeat

Sea control does become increasingly crucial to the Allied effort in a European conflict if a conventional war extends longer than a few weeks. The need for military support and economic, especially fuel, resupply increases with time. Only sealift can transport supplies in required quantities. The prospects for freer transoceanic transit likewise improve as the war lengthens, if antisubmarine warfare is undertaken at the outset of hostilities.

The Navy sees a vital need for sea control in the European context. It stresses the importance of neutralizing the Soviet submarine threat, which implicitly assumes enough time to accomplish that mission. This assumption may not be fully shared by other services and by our Allies. At the very least, however, the Navy's ability to control the seas over time represents a hedge against a longer war. Should a conventional war extend past a month, for whatever reason, and however great expectations of its duration may be to the contrary, its successful conclusion could then critically depend upon the Navy's ability to ensure safe resupply by controlling vital sealanes.

If the United States had no capability to fight a protracted war, it might well be forced to choose between nuclear war and surrender, should the initial course of conflict favor the Soviet Union. Indeed, the Soviets, with their doctrinal emphasis on the use of nuclear weapons, might anticipate the United States response. The USSR might assume that it would be nuclear and might launch their own preemptive strike. Sea control may provide a hedge against the need for the United States to make such drastic early choices, and for the Soviets to anticipate them, in a war fought with conventional weapons. Additionally, sea control may also serve as a hedge against total defeat, even if the war in Europe is lost. Preventing further Soviet expansion outside Europe's borders, and ultimately ending the war on favorable terms, may well require control of the world's oceans.

POWER PROJECTION IN A EUROPEAN CONFLICT

While the Navy deems its primary mission of sea control to be crucial to Allied goals in a NATO war, both it and the Department of Defense also draw attention to the possible contribution of naval aviation to the NATO land battle.^{6/} This contribution constitutes a key element of the Navy's power projection mission, which in fact is one of its collateral missions.^{7/} As a collateral mission, power projection is technically meant only to be carried out to the extent that resources are freed from the Navy's sea control needs. In any

6. See, for example, the reply of Vice Admiral James H. Doyle, Jr. to Congresswoman Schroeder, House Armed Services Committee, Hearings on Military Posture (H.R. 12438), Department of Defense Authorization for Appropriations for Fiscal Year 1977, 94-2, 1976, Part 4, p. 341. See also comments in the CVNX Characteristics Study Group Report, reprinted in ibid., p. 271, and the comments of Honorable Leonard Sullivan, Jr. before the Task Force on National Security Programs of House Budget Committee, Hearings: Fiscal Year 1977 Defense Budget, 94-2, 1976, p. 200.

7. 10 U.S.C. 125; DoD Directive 5100.1 (December 3, 1958, revised June 17, 1969).

event, it presumes at least prior local sea control, since naval forces could not effectively project power ashore if they were themselves under heavy attack at sea. 8/

Power projection takes a second form in addition to air power projection, namely, amphibious assault. However, amphibious assault is not unequivocally a collateral mission as is the contribution of air to the land battle. 9/ Amphibious assault is a primary mission of the Marines. Insofar as the strategy calls for Marine assaults, Navy ships must be used, though again it is difficult to envisage a successful amphibious assault were control of the sea not first obtained. 10/

The importance which the Navy attaches to air power projection draws heavily upon its postwar experience in the Pacific theater. It was in the Pacific, during World War II, that carrier-launched aviation achieved its dominance in naval conflict. The Korean and Vietnam wars were the scenes of successful and unopposed carrier air launches against land targets. Clearly, the Navy cannot--and does not--assume that power projection in an Atlantic context will not meet with severe Soviet air- and sea-based opposition. But its stress upon that mission does seem to imply a faith in its ability to create conditions approaching those of its postwar Pacific experience, where power projection proved so successful.

8. Whether power projection only requires sea control in the local battle or ocean-wide sea control depends on the point of embarkation of the attacking forces. Should they have to traverse an ocean to reach their targets, they will need protection in more than just the local battle sector.

9. Nor may it be identified solely with power projection. Marines might undertake assaults expressly in order to ensure continued naval control of vital sea areas. See statement of Admiral James L. Holloway III before the House Appropriations Committee, Department of Defense Appropriations for FY 1977, Hearings, Part 8, 94-2, 1976, p. 106.

10. See ibid., p. 110. See also note 8 above, which applies to amphibious assault as well.

Whether those conditions can indeed be created in the Atlantic is at best problematical. The Battle of the Atlantic scenario presumes Allied 11/ losses during the early stages of conflict. These can only be minimized if the Navy seeks to contain enemy surface, air, and subsurface threats to the sealanes. Given this multiple task, most naval assets will have to be devoted to the sea control mission. With respect to the submarine threat, this mission will extend for several weeks or more. It will probably require the employment of all current assets with ASW capability, even if some would be more cost/effective in other roles. Thus, the Navy will not really be in a position to project power until well into the war. At that time it also may have fewer assets with which to project power.

Of course, it is possible that the Navy's assets might indeed be available if the Soviet attack were directed against the flanks of NATO rather than its center. The pressures for resupply might not be as great, but the requirement for naval power projection against attacking forces, in Norway, for example, would certainly be significant. However, many of these contingencies do not seem as plausible as a possible attack in central Europe. Indeed, some of them are likely to take place only in the context of an all-out European war. Thus it is difficult to divorce a U.S./Soviet naval conflict in the Mediterranean, involving possible U.S. naval projection against Soviet allies in that region, from a "central front" scenario. If the U.S. and Soviet navies were actually to collide, it

11. This paper does not dwell at length upon the Allied contribution to the Western naval effort. There certainly will be some such contribution (see p. 12), but its extent is the subject of much debate, though experts agree that it will be far more significant than the corresponding role of the Warsaw Pact allies. This paper focuses on systems that, with minor exceptions, are not duplicated by Allied navies. However, it assumes that all Allies will remain in the alliance and that they would respond to perceived threats to their own territory (e.g. overflights, or near overflights, by Soviet bombers; see below, pp. 13, 24).

is uncertain that the military command authorities of both countries would agree to limit themselves to a sea battle against each other.

An attack on Norway, if indeed deemed a plausible contingency, does seem to be one against which the Navy could respond with projection of its naval air power. However, even if the Navy's assets are available for projection, they still will have to overcome the advantage that geography gives to the Soviet Union in that region. 12/ Indeed, this is the major difficulty that confronts all possible projection missions that are more closely related to the Case I scenario of a central European conflict. It is not clear whether the most likely type of projection in Europe under the Case I scenario would be one of close air support, as in postwar Asia (in this case it would be along the central German front), or whether it would involve naval air attacks on Soviet naval installations. 13/ In either case, and especially in that of the lesser Norwegian contingency, U.S. forces will have to venture into areas near the Soviet homeland. 14/

Soviet defenses get much stronger as the Soviet Union is approached. These defenses comprise both long-range assets, such nuclear-powered submarines and long-range bombers, as well as large numbers of effective but range-limited systems, such as medium bombers, patrol missile boats, and diesel submarines. All of these systems possess antiship homing missiles. Together

12. See map on page 25.

13. Admiral Holloway clearly alluded to this mission, which he viewed as an integral part of sea control. See House Appropriations Committee, DOD Appropriations Fiscal Year 1977, Hearings, Part 8, p. 111.

14. Carriers could launch aircraft from the comparative safety of the English Channel. However, it is questionable whether expensive ships are necessary or more cost/effective for a task that could be equally well performed from East Anglian bases less than 100 miles further away.

they constitute a most formidable and sophisticated threat to Allied naval platforms that are meant to project power from the Baltic or Norwegian seas. Combined Soviet systems are likely to exert enough pressure on naval forces to force them to be preoccupied with their own survival rather than with projection of their power ashore.

Indeed, it is in the context of power projection that there is the highest probability of a saturation attack upon Allied forces.^{15/} A saturation attack is one in which enemy forces effectively coordinate the timing of their attack so that successive layers of defensive systems cannot cope with all the oncoming projectiles they must target. It is an extremely complex and difficult operation, one which the Soviets demonstrated in their Okean 1970 and 1975 exercises, but which could prove more intractable in actual combat. Nevertheless, were the Navy to seek to project power anywhere within the range of most Soviet land-based aviation, the Soviets might successfully utilize their sophisticated command and control systems to coordinate a simultaneous cruise missile attack from submarines, surface warships and planes of various types. If the attack took place in the Baltic Sea or east of North Cape (see map on page 25.), it would include patrol missile boats as well. It is questionable whether U.S. naval forces could survive such a coordinated attack in order to project power effectively against either Soviet ground forces or naval installations.

NAVY SEA CONTROL AND PROJECTION MISSIONS IN THE MEDITERRANEAN: A SPECIAL CASE IN THE EUROPEAN SCENARIO

The theater of naval conflict with the Soviet Union in a NATO war fought primarily in Central Europe is likely to include the Mediterranean Sea as well as the Atlantic Ocean. The Navy could try to carry out both the sea control and projection missions in that area. The Mediterranean not only represents the sealane to America's Allies in southeastern Europe; it also potentially could serve as a base for carrier-launched air attacks on Eastern Europe and the southern part of the USSR.

15. It is far more difficult to establish whether--and where--a saturation attack might take place with respect to the sea control mission in the European context. This question is addressed below, p. 23 ff.

The general observations outlined above about the relative importance of both missions to the European conflict apply to a large extent to the Mediterranean scenario. Sea control in that sea is less important in a short or nuclear war for all the same reasons that it is with respect to the Atlantic. Power projection still cannot preempt the priority, or the assets, that sea control commands. However, the effects of geography on the feasibility of the projection mission and on the threat to the carrier in the Mediterranean are somewhat different from those in the Atlantic. Additionally, some aspects of that Soviet threat have special implications for the sea control mission as well.

Carrier-based attacks from the Mediterranean on targets in the southern part of the Soviet Union would certainly meet with fierce Soviet resistance. In view of this potential threat, the Soviets have sought to confront U.S. warships in the Mediterranean itself. The threat to Allied naval forces in that sea is thus somewhat different from that in the Atlantic.

It should be noted that the Soviet threat exists primarily in the eastern Mediterranean. The French and Italian fleets support U.S. naval patrols in the western part of the sea. Land bases in Spain add to the air cover which carriers provide the Allied fleet. On the other hand, the Soviet Union maintains a permanent squadron of over fifty surface (including support) ships and submarines in the eastern Mediterranean.^{16/} This force contains about six Kara or Kresta II cruisers and Krivak destroyers, all armed with short-range, possibly antiship, SS-N-10 missiles. It now contains an antisubmarine helicopter carrier and may, in the future, have a V/STOL(vertical/short take-off and landing) carrier. Additionally, the Soviet squadron probably numbers some 10-15 submarines. These include cruise missile units; all are difficult to track with sonar, given the sea's topographical and climactic conditions.

16. See Jesse W. Lewis, Jr., The Strategic Balance in the Mediterranean (Washington, D. C.: American Enterprise Institute for Public Policy Research, 1976), p. 59.

The Soviet air threat in the Mediterranean is difficult to assess. The Soviets no longer benefit from Egyptian air bases, and would probably have to launch their bombers from Black Sea bases.^{17/} Their capability would in any event be restricted primarily to the eastern Mediterranean.

The Threat of a Surprise Attack

The greatest ongoing threat to the U.S. fleet from the Soviet Mediterranean force is that of a coordinated surprise missile attack, incorporating air, surface, and subsurface units. This threat applies to a fleet that seeks to protect sealanes as well as to one that attempts to project power. If successfully launched, it could seriously damage U.S. Sixth Fleet carrier task forces. With little response time available, carrier based interceptors could barely contribute to task force defense, while escort mounted rapid-reaction missile defenses would probably be saturated by the large number of incoming missiles. Soviet naval aviation is, however, the critical element in the coordinated saturation attack. While Soviet ships and submarines often patrol within a few miles of American task forces, Soviet planes would have to leave their Black Sea bases and come close enough to the battle area to coordinate their missile attacks with other fleet units. Given any warning signals, such as massive overflights of Turkey, U.S. planes, both land- and carrier-based, could intercept Soviet bombers while the carriers maneuvered themselves into somewhat more favorable defensive positions. A total surprise attack thus probably would involve no bombers, but only Soviet surface ships, submarines, and V/STOL aviation. Even in the latter case some early recognition of threat might still be possible.

17. It is problematical whether Libya or some other erstwhile Soviet ally bordering the sea would allow Soviet bombers to utilize its bases during a NATO war. Admiral Holloway has noted that the air threat is not persistent because Soviet planes have limited combat time on station before they must return to bases for refueling and rearming. (Testimony before House Appropriations Committee, DoD Appropriations, Fiscal Year 1977, Part 8, p. 187.)

Certainly, if considerable warning time were available, the fleet of carriers and escorts could perhaps withdraw to the western Mediterranean. ^{18/} There they could await the arrival of convoys from America to the Mediterranean Allies, conduct antisubmarine operations, and launch long-range strikes against Soviet naval forces.

Apart from Surprise, No Greater Threat in Mediterranean

Apart from the threat of a surprise attack, which in practice would be difficult for the Soviets to implement, the Soviet threat to Allied sea control efforts in the Mediterranean is no greater than in the North Atlantic. Power projection, on the other hand, would be no less difficult to implement. While geography may not be as great an obstacle, there remain the other problems of acquiring sufficient assets for projection and ensuring that adequate defenses are available for the task forces. In any event, land-based tactical aviation in Greece and Turkey could perform the same mission with shorter distances to transit.

THE NAVY'S MAJOR MISSIONS IN EUROPE: RECAPITULATION

Of the Navy's two major missions, sea control and power projection, it is the former that seems more relevant and crucial to the successful outcome of a European conflict. However, sea control only assumes major importance if the war remains conventional, and if it lasts for some time. In this respect sea control in a European war against the Warsaw Pact differs from that which could take place in a scenario involving conflict with Third World states. A Third World contingency may require U.S. aviation to defeat enemy air, surface, and subsurface units, such as they may be. However, sea control, if it would have to be fought for at all, would be of a local nature. It would be sought immediately to allow naval air and amphibious forces to project power ashore, much as they did during the Korean and Vietnam wars. Its purpose in this contingency would not be to allow convoys to traverse the oceans, nor would U.S. forces be preoccupied with a submarine threat to those convoys.

Power projection would itself differ in the European and non-European contexts. In the former case, it can

18. See Admiral Holloway's comments, Ibid., p. 202.

be conducted only at great risk to Allied forces, in the face of a possible Soviet saturation attack, and only after sea control no longer demands most Navy assets. In the non-European/non-Soviet case, power projection would be simpler. The threat would be less sophisticated; naval platforms would be relatively safe. The following matrix indicates the major differences between sea control and power projection in the European and Third World contexts.

		Europe/USSR	Europe/USSR-Med	Third World/Non-USSR	
		Sea Control	Projection		War for which most relevant
Sea Control	High	Long, Conventional	Long, Conventional	Conventional	Threat level
	High ^a	High	High ^a	Low	Probability of success
	High ^a	Long, ^b Conventional	Long, ^b Conventional	Conventional	War for which most relevant
Projection	Very high/saturation	High	Low	Low	Threat level
	Low	Low	Low	High	Probability of success

a. Only over long term.

b. Long only if insufficient sea control assets in fleet to allow for immediate utilization of projection units.

The Mediterranean aspect of the Europe/USSR scenario provides a special case in this matrix. It shares the assumptions that underlie the formation of the Europe/USSR scenario. It represents a similar level of Soviet threat to sea control and power projection except with respect to a surprise attack. Sea control can be achieved over the long term. However, the probability of successful power projection is still not particularly good, because the threat to the U.S. forces is still significant.

As noted above, this paper addresses U.S. naval force options with respect to the European scenario, for it is primarily in terms of the demands of that scenario that those forces are sized. The following chapter discusses the evolution of the naval order of battle in terms of those missions. The subsequent discussion of possible mission-oriented changes in the fleet can then be related to the mix of present naval assets and to the mission orientation which they reflect.

CHAPTER III THE NAVY'S MISSIONS AND ITS ORDER OF BATTLE: THE DOMINANCE OF THE AIRCRAFT CARRIER

The Navy presently numbers about 476 ships. Just over half of them are allocated to the Atlantic fleet, though considerably more ships would be available for a NATO conflict. Many of Navy's weapons platforms have a multimission capability, contributing to both the sea control and power projection missions. Table 1 illustrates the Navy's assessment of its order of battle by mission function.

Table 1 also indicates that the aircraft carrier is the most flexible naval system in terms of mission capability. In fact it is the key to the Navy's offensive capabilities. Because its aircraft could deliver ordnance far beyond the 20-mile range of a battleship's major guns, the carrier became the Navy's dominant warship in World War II. The carrier itself was vulnerable when hit, but as planes proved to be superior offensive weapons, battleships were assigned to provide defenses for the carrier if it could not launch its aircraft outside enemy retaliatory range. 1/ The carrier was not outfitted with significant defense systems of its own, since to do so detracted from the space available for aircraft facilities, unless larger carriers were built. Even then, adding more planes to the carrier wing was preferred to adding defensive systems. 2/

THE CARRIER TASK FORCE CONCEPT: CARRIERS FOR OFFENSE,
ESCORTS FOR DEFENSE

The carrier task force concept thus came into being, whereby a number of escorts--destroyers or

1. See Alva M. Bowen, "Conditions That Led to the Tactical Obsolescence of Battleships," paper included in remarks of Honorable Patricia Schroeder, Congressional Record, June 16, 1976, p. E3429, cols. 1-2.

2. Adding defensive systems could also complicate carrier flight operations.

Table 1
Navy Order of Battle:
Warfare Tasks/Ship Capabilities Matrix

SHIP TYPE	13 ^a CARRIERS	180 ^a SURFACE COMBATANTS			117 ^a SUBMARINES		62 ^a AMPHIBIOUS	
	CV	CG	DD	FF	SSBN	SSN	LHA LPH	LPD LST ETC
SEA CONTROL TASKS								
Anti-Air Warfare	■	▲	●	●			●	
Anti-Submarine Warfare	▲	▲	▲	▲	●	■		
Mine Warfare	■				●	▲	▲	●
Anti-Surface Warfare	■	▲	▲	▲	●	▲	●	●
Reconnaissance	■	●	●	●	●	▲	●	●
Command & Control	■	▲	●	●			●	●
Electronic Countermeasures	■	▲	▲	▲			●	●
PROJECTION TASKS								
Nuclear Strike	▲	●			■	●		
Interdiction	■	●	●				▲	▲
Amphibious Assault	●						■	▲
Close Air Support	■						●	
Shore Bombardment		●	■	●				
SUPPORT TASKS								
Resupply	▲						■	■
Quick Response Resupply	■						●	●
Maintenance and Repair	■	●	●				●	●

KEY: ■ HIGH CAPABILITY COMPARED TO OTHER SHIPS.
 ▲ DIFFERENT METHOD OF ACHIEVING CAPABILITY COMPARED TO ■.
 ● NO EXTENSIVE CAPABILITY COMPARED TO ■.

Sources: *CVNX Characteristics Study Group Report*; HASC, *Hearings on Military Posture, FY 1977*, Part 4, p. 270.

a Numbers as of Sept. 30, 1976 (CBO estimates). Support ships excluded.

cruisers--accompanied and defended a carrier whose air wing provided the force's offensive power. The air wing also provided the task force with its outermost defense perimeter. Interceptors patrolled some 500 miles from the force, while antisubmarine planes could hunt submarines at longer distances from the carrier. 3/ Escorts provided "intermediate" or "area" defense around the carrier. With antiaircraft missiles and guns and/or antisubmarine rockets and torpedoes, escorts were meant to attack enemy units that approached the task force, having avoided detection and destruction by air units. In turn, if enemy units penetrated area defenses, they still had to contend with "point" or last ditch defenses on board the carrier itself. These defenses (later termed ASMD-antiship missile defense) provided rapid-fire projectiles against planes or missiles.

As escorts became fully identified with the "defense in depth" concept of the carrier task force, their offensive systems came to be deemed superfluous, given the tactical air capabilities that the carrier possessed. Replacements for battleships possessed almost no offensive power. 4/ They were even classified in terms of the enemy against which they had to defend: "antisubmarine," "anti-air," or "antisubmarine and anti-air" frigates, destroyers, and cruisers. In turn, offensive power became concentrated in the carrier's air wing.

Carriers also came to influence fleet size greatly. Each carrier required a given number of escorts, based on the extent of their sonar coverage for antisubmarine warfare. Both carrier and escorts also required

3. It should be noted that until the early 1970s, the Navy divided carriers into attack (CVA) and antisubmarine (CVS) types. It found that assigning both tasks to multipurpose carriers (CV/CVN) was more cost/effective, particularly as the carrier force level declined.

4. An extreme example of this tendency was the cruiser USS Northampton, which was commissioned in 1951. It displaced 14,700 tons, and was armed with a single 5-inch gun.

replenishment and support ships, which themselves demanded escort protection. The carrier thus became the core ship of the U.S. Navy. 5/

Carriers Remain Sole Offensive Platforms

There are at present thirteen carriers in the fleet. Frigates and destroyers have little offensive capability and continue to be geared primarily to defend carrier task forces, the convoys they escort, and, of course, themselves from air and submarine attack. Cruisers have little more in the way of offensive power. Their task remains to defend the carrier and themselves. All three escort types are capable against either submarines or air threats or both. They presently have little capability against surface ships. Hunter/killer submarines, equipped with advanced active/passive sonar and homing torpedoes, are geared to antisubmarine warfare, and at present likewise have limited antiship capabilities. Offensive power and antiship strikes thus continue to be the preserve of the aircraft carrier.

Implications of Harpoon. It should be noted, however, that the carrier will not remain the Navy's sole significant offensive unit for very long. With the introduction of the Harpoon missile, surface ships of all sizes, submarines, and various aircraft types will all have significantly greater offensive capabilities. However, Harpoon is only an antiship missile; it does not in any way provide naval units with the ability to project power ashore. This will continue to be the exclusive ability of the aircraft carrier.

Carriers Have Emphasized Projection Mission. Since the end of World War II, the carrier has, in fact, primarily served to project power, although it is nominally a multimission platform. The U.S. Navy has not fought a major sea battle since the end of that war, and it has had unchallenged control of the sea wherever it has chosen to operate. As noted above, carrier aircraft were able to contribute heavily to the attack on enemy forces and land bases in the Korean and Vietnam wars. The carrier itself was never threatened.

5. A discussion of the impact of carriers on force sizing may be found in U.S. Naval Force Alternatives (Congressional Budget Office, 1976), pp. 15-18, 70-74.

Carrier activity against Soviet targets would not be as straightforward. Soviet systems pose a substantial threat to the carrier. They must be accounted for when considering possible carrier missions in a NATO war.

Evolution of the Soviet Threat to the Carrier

The Soviet Navy has undergone several transformations since Stalin's death in 1953. Stalin had planned to launch a big-carrier navy, emulating that of the United States. However, his successors and the Soviet Navy's leading figure since 1955, Admiral Gorshkov, chose instead a fleet that was geared to counteract the strategic nuclear threat which U.S. carriers then posed. The Soviets undertook to build a huge submarine fleet, complemented by destroyers and cruisers, that could confront the carriers in seas that were at some distance from the Soviet Union. To provide the Soviet fleet with a stand-off capability to offset that of carrier air, they adapted the emerging technology of homing cruise missiles, which they fitted to surface ships, submarines, and aircraft. Soviet naval air was no match for its U.S. counterpart, in terms of both range and capability. The Soviet answer was missiles such as the SS-N-3 Shaddock. With a range of over 400 nautical miles, the Shaddock could be launched from surfaced submarines, such as the nuclear powered Echo class, and warships, such as the Kynda cruiser. Soviet anticarrier strategy was to coordinate cruise missile attacks from surface ships, submarines, and aircraft. Lastly, in addition to reconstructing the Soviet major surface and subsurface fleet, Gorshkov modernized and strengthened Russia's flotilla of small patrol boats, which traditionally guarded her immediate coastal areas and which were also fitted with cruise missiles to menace carriers or other ships that approached them.

With the appearance of the U.S. long-range sea-based nuclear missile deterrent, the Soviets cautiously began to adjust their emphasis to include antisubmarine warfare. The two antisubmarine Moskva-class helicopter carriers, which they unveiled in the late 1960s, were particular evidence of their changed perception of the

American strategic threat. 6/ Nevertheless, they continued, and continue, to mount impressive and constantly updated anticarrier systems that, with each succeeding generation of warships, are carried farther from Soviet home waters. Soviet naval air has vastly improved its capabilities with the appearance of the Backfire bomber, whose unrefueled flight radius may extend as far as 6,000 miles. 7/ These bombers can launch high-speed air-to-surface antiship missiles at a stand-off range of over 100 miles. The Backfires currently are augmenting the 400-odd Badger medium-range (1,500 mile) missile bombers of the Soviet Naval Air Force. Soviet surface vessels now include the aircraft carrier Kiev, the first of a class of at least three and perhaps as many as six ships. 8/ Though nominally an antisubmarine vessel, the Kiev could still employ its 15-25 Yak V/STOL planes in a surprise antishipping strike or to project power against lightly defended targets far from the USSR. It also boasts a large antisurface ship missile suite, including what may be yet another updated longer-range cruise-type missile.

6. If these ships were meant to counter U.S. strategic submarines in the Mediterranean, they were immediately obsolete, which may account for the fact that only two were built. Improvement in U.S. missile range, culminating in the introduction of Poseidon, extended SSBN capabilities beyond the range of Soviet ships. (See Norman Polmar, Soviet Naval Power: Challenge For the 1970s, rev. ed. (New York: Crane and Russak, for National Strategy Information Center, 1974), p. 48.)

7. Estimates of Backfire range are the subject of considerable controversy. Norman Polmar has cited estimates of 2,750 to 3,500 miles in "Soviet Naval Aviation," Air Force Magazine, March 1976, p. 70. Jane's All The World's Aircraft, 1975-76, has an estimate of 3,570 miles. Aviation Week has published estimates of 5,000-6,000 nautical miles, i.e. 5,750-6,900 m. (Aviation Week and Space Technology, Sept. 13, 1976, p. 13 and October 18, 1976, p. 15).

8. See Jane's Fighting Ships, 1975-76; John Erickson, "Soviet Military Capabilities," Current History, Vol. 71 (October 1976), p. 135.

The Soviets have also been upgrading their reconnaissance efforts. These were most dramatically displayed in the 1975 Okean exercises, during which Soviet reconnaissance planes (such as the Bear-D type) flew several hundred missions over the North Atlantic, Pacific, and Indian Oceans. Additional surveillance was conducted by reconnaissance satellites that were launched before and during the exercise. The Soviets were able to coordinate their reconnaissance efforts, locate the "enemy," and then conduct coordinated strikes. 9/

Soviet anticarrier tactics are probably still evolving. There have been indications for some time that Soviet anticarrier strategy could now include short-range attacks on carriers (in which the new Kiev carrier could participate). 10/ These could combine with longer-range attacks to saturate carrier defenses. Thus, the newest Soviet cruiser class, the Kara, which is still in production, mounts short-range (30 nm.) SS-N-10 antiship missiles, in addition to anti-aircraft missiles and guns. Similarly, the Charlie-class submarine carries short-range (25-30 nm.) SS-N-7 missiles which it can fire while submerged. Indeed, torpedo-firing nuclear submarines could also fit into this strategy; production still continues on the Victor-class. Lastly, the Soviets have continued to produce Nanutschka missile boats. These 800-ton vessels can launch SS-N-9 antiship missiles at a range of over 50 and perhaps up to 150 nm. 11/

IMPLICATIONS OF THE THREAT FOR THE CARRIER MISSIONS IN THE ATLANTIC

It was noted above that the combined and coordinated Soviet air, surface, and subsurface threat of a saturation attack seems most probable when the Navy pursues its power projection mission in the context of a European war. If carriers venture within 500 nm. of the Soviet

9. See Lt. Cdr. Bruce W. Watson, USN, and Lt. Cdr. Marguerita A. Walton, USN, "Okean-75," United States Naval Institute Proceedings, Vol. 102 (July 1976), pp. 93-95.

10. Polmar, Soviet Naval Power, p. 45. This book provides a useful outline of Soviet naval forces. See also Polmar, "Soviet Naval Aviation," p. 74.

11. Polmar, Soviet Naval Power, p. 121.

Union, Soviet naval air, surface ships, and submarines would all come into play to counter what the Soviets probably would consider a carrier attack on their homeland. With excellent reconnaissance, and advanced electronic techniques to jam U.S. systems and support their own, a coordinated Soviet missile attack could very well saturate all lines of carrier defenses--air patrol, area defense, 12/ and point defense.

The situation is different with respect to the sea control effort. The Soviet threat to convoys, and to carriers protecting them near the Atlantic sealanes, is likely to come primarily from submarines. Carriers would be needed in the anti-air and possibly antisurface role, particularly, and perhaps only, in the initial stages of conflict. In the main, however, their task in the Atlantic may well be akin to that of the CVS--the antisubmarine carrier. 13/

The threat from Soviet naval aviation diminishes markedly below the Greenland-Iceland-Britain (G-I-UK) gap (see map). Badgers flying from the Kola Peninsula would have to refuel in order to threaten carriers or convoys on the sealanes, and may be vulnerable while doing so. They as well as Backfires (which need not refuel) would both have to survive land-based air defenses and interceptors that could operate from Norway, Greenland, Iceland, and Britain. Clearly, the Soviet air threat to the Atlantic sealanes is unlikely to match that which would be mounted nearer to the Soviet Union.

12. No rapid-reaction area defense system, not even AEGIS (of which more below, pp. 33-34), can be expected to cope with the numbers of missiles that the Soviets might fire in coordinated fashion from combined air, surface, and subsurface systems.

13. However, the CVS is not a cost/effective system. See below, p. 40.

Map of Northeast Atlantic and Mediterranean Regions



The absence of air cover could inhibit Soviet surface warships from venturing into the Atlantic to threaten carriers or convoys. Not only could they be tracked as they deployed, 14/ but they would be vulnerable to carrier- and land-based tactical air strikes, mines at geographic "choke points," and Harpoon surface-to-surface missiles. 15/ Even the Kiev V/STOL carrier provides little air cover. It too would be vulnerable to long-range strikes from aircraft carriers and perhaps also to warships carrying Harpoon. If Soviet warships sought to engage the U.S. fleet in an Atlantic battle and were able to reach the open ocean, their limited reload capability would hamper their ability to survive past the initial exchanges.

Submarines, on the other hand, cannot be quickly eliminated. They would not be subject to the limitations of surface ships, since they rely on concealment. They also could avoid being "intercepted" at geographically narrow "choke points" if they predeployed in the open oceans before the commencement of hostilities. Once on the open seas, submarines become a persistent threat; as noted above, ASW is a time-consuming process.

Carriers Stress Projection Mission

Carrier air wings, as presently configured, tend to stress the projection mission as opposed to sea control requirements. A typical multimission carrier (CV) air wing consists of two squadrons each of fighters and

14. Remarks of Admiral Holloway, House Appropriations Committee, DoD Appropriations, FY 1977, Hearings, Part 8, p. 187.

15. General George Brown, Chairman of the Joint Chiefs of Staff rates the Soviet surface fleet third behind the submarine and air threats. See his Posture Statement, 1977, reprinted in House Appropriations Committee, Hearings on Military Posture, FY 1977, Part 1, p. 427.

attack aircraft, as well as smaller numbers of antisubmarine, reconnaissance, electronic support, and electronic countermeasures aircraft (see Table 2). Given the need to defend against a multiple air/surface/subsurface threat to Allied navies and shipping, coupled with a U.S. projection mission, the Navy envisions that all of these planes could come into play in a sea battle. In its view, the squadrons of fighters/interceptors would serve on combat air patrol several hundred miles from the carrier. They would encounter enemy bombers and long-range cruise missiles well before the carrier task force was engaged. Attack planes could operate at long distances (over 500 nm.), to attack land targets as well as seek out enemy vessels before there is any encounter with the carrier itself. Support and suppression planes would provide early warning and electronic countermeasures (such as jamming enemy radar) which assist fighters in their air combat roles. Antisubmarine planes, with combat radii exceeding 1,000 nm., would prosecute submarine contacts that were made by submerged sonar arrays or by sonobuoys, and could employ torpedoes to destroy the submarines before they could threaten the carrier.

If the carrier task force is not seeking to project power, but instead is defending itself while attempting to protect sealanes, it may be able to accomplish its mission with fewer aircraft. The carrier's S-3 planes and the capabilities of its escorts could provide it with some defense against submarines. Given the likely Soviet threat to the sealanes, one would not expect to see many attack planes on an Atlantic sea control configured carrier. Antisubmarine S-3 planes armed with Harpoon antiship missiles could provide whatever air-to-surface attack capability that was needed against Soviet surface warships. One would also expect a rather more modest fighter capability. Soviet long-range bombers are no match for the Navy's modern interceptors, which would interdict them far from the convoys (and the carrier). The F-14, with its Phoenix system, can tackle

Table 2. Typical Carrier Configuration For Sea Control, Power Projection (CV)
Nimitz Multipurpose (CVN) Carriers

Type	Mission	Number of Planes		
		Projection Mode (CV)	Sea Control Mode (CV)	Nimitz Airwing (CVN)
F-4/F-14	Fighter/Interceptor	24	24	24
A-7	Light Attack	24-36	12-18	24-36
A-6	Medium Attack	12	12	12
RA-5	Reconnaissance	3	1-3	3
EA-6	Electronic warfare	4	4	4
E-2	Early Warning	4	4	4
KA-6	In-flight Refueling	4	4	4
SH-3	ASW Helicopter	0	8	8
S-3	ASW Aircraft	0	10	10
C-1	Cargo Aircraft	0	0	1
TOTAL		75-87	79-87	94-106

Source: Jane's Fighting Ships, 1975-76.

multiple targets simultaneously. It is thus more effective as an interceptor than its predecessor F-4. A smaller air wing may be sufficient for carrier protection. To the degree that it is, the remainder of the present carrier air wing clearly is dedicated solely to projection.

RECAPITULATION: SEA CONTROL, POWER PROJECTION, AND THE NAVY ORDER OF BATTLE

Much of the postwar Navy order of battle has centered around one system: the aircraft carrier. Around the carrier has sprung the task force concept, with requirements for carrier escorts, task force replenishment ships, and escorts for the replenishment ships. The task force concept has until recently designated the carrier as virtually the sole repository of conventional navy offensive power, to the diminution and ultimate exclusion of escort offensive capabilities.

Postwar carrier operations have emphasized the use of carrier aviation in the offensive, power projection configuration. The carrier's air wing can also perform sea control missions in those situations where sea control must be won. Such situations have arisen in the Navy's postwar operations against Third World opponents. They would, however, arise in a European contingency, when a conventional war extends long enough to make sea control imperative. The carrier's sea control capabilities could then prove useful to the Allied effort. However, it is not clear whether the type of carrier that in the past has adequately supported power projection is necessary for sea control in the Atlantic. The demands of the sea control mission--the threat which must be overcome--in the Atlantic or the Mediterranean may not require a carrier with a wing that includes a significant number of attack planes and interceptors similar to that presently deployed. Whether a carrier with such an air wing, or indeed any carrier, is needed in additional quantities above present force levels, will therefore also depend on whether and to what degree it is expected to project power in a European scenario. The utility of the task force concept, which interweaves

carrier needs with requirements for certain types and numbers of escorts, itself varies with differing assessments of carrier force level requirements in the Atlantic scenario. Different mission objectives will therefore affect escort levels as well.

Mission-oriented alternatives thus may not justify the stress that the Navy has placed on carrier task forces since the end of the Second World War. Whether they do will very much depend on the degree to which the carrier task force concept proves relevant to the missions which the Navy is expected to fulfill and to the scenarios to which those missions relate. The force options that appear in the following chapter will address both carrier and certain escort requirements within the context of alternative concepts of naval mission priorities, primarily with reference to the European scenario of a NATO war against the Soviet Union.

Annual Navy budgets and evolving five-year plans seek to enhance the ability of programmed forces to fulfill their assigned missions. The Navy views those missions as important, indeed crucial, to Allied success in a NATO contingency. Programmed changes to naval forces should contribute to that success. This standard may be applied when asking whether proposed changes are relevant to the demands of the Navy's sea control and projection missions in the context of a NATO war. These questions arise in particular when assessing alternative mission-oriented naval force programs for fiscal years 1978-82. The programs outlined in the following pages will focus particularly upon the three major interrelated systems that could have a major impact on program size, composition and cost in both the five-year period fiscal years 1978-82 and the fiscal year 1978 budget in particular: The CVN-71 carrier, the strike cruiser, and the AEGIS air defense system. The Congress considered each of these programs in its debates on the fiscal year 1977 Navy budget, but voted only advance funding for the carrier and deferred its decision on the cruiser. As an introduction to the various naval program options that the Congress might consider for fiscal year 1978, it may be useful to reexamine the course of Congressional action on naval programs for fiscal year 1977.

THE ADMINISTRATION'S FISCAL YEAR 1977 NAVAL FORCE PROGRAM

Secretary of Defense Rumsfeld's fiscal year 1977 Posture Statement outlined a five-year naval force procurement program that was meant to reverse the decline of the Navy's force level from over 970 ships in 1967 to an estimated 476 ships by the end of fiscal year 1976. The program called for procurement of major warships as well as guided-missile frigates and submarines and support ships. The total cost of the Administration program for new construction was \$28

billion. 1/ Rumsfeld drew special attention to a proposed new carrier and to the AEGIS system and its possible platforms.

Carriers

Rumsfeld stated that he wished to maintain a 13-carrier force into the 1980s. At this level the Navy would be able to pursue both its sea control and power projection missions with some margin of superiority over the Soviet Navy. To maintain that level, it was necessary to begin replacement of the six Forrestal-class carriers, the first of which was delivered to the fleet in 1955. 2/ He proposed two new carriers for the fiscal years 1977-81 period, and called for new carrier starts every two years. Rumsfeld added that the Department of Defense was examining several means of maintaining the 13-carrier force. These included smaller nuclear-powered carrier variants (50,000 tons) in place of the 90,000-ton Nimitz, service life extension of the Forrestal ships, and V/STOL carriers. 3/

Carrier force levels had declined from 24 attack and antisubmarine carriers in 1964 to 13 multipurpose types in 1976. This decline resulted primarily from the retirement, without replacement, of over-age ASW carriers (CVS). It was speeded by an increase in carrier construction time. In 1976, this increase meant that if constant force levels were desired, aging carriers would have to remain in the fleet for

1. Net of funds requested for cost growth and escalation on prior year programs. Figures are in fiscal year 1977 dollars.
2. Donald Rumsfeld, Report to the Congress on the Fiscal Year 1977 Budget and Its Implications for the Fiscal Year 1978 Authorization Request and the Fiscal Year 1977-81 Defense Programs (January 27, 1976), p. 164.
3. Ibid.

longer periods before they were replaced. The Forrestal, the first of its class, joined the fleet in 1955, three years after the Congress authorized funds for its construction. The Nimitz, in turn the first of its class, was commissioned no less than eight years after Congressional authorization. If the Congress authorized fiscal year 1978 funds for a new carrier, it probably would not enter the fleet until fiscal year 1984, at the earliest. That ship would replace one of the Midway-class carriers, which in fiscal year 1984 would have seen over 36 years of service. The active life-span of a carrier has traditionally been considered to be 30 years. 4/

Despite Rumsfeld's emphasis on the pressing need for carrier construction, he did not initially request long-lead carrier funds in fiscal year 1977. 5/ That request was to be made in fiscal year 1978, presumably when the executive branch determined what kind of carrier it wanted to have. 6/ In this regard the Administration undertook (in January, 1976) a National Security Council (NSC) study of future U.S. naval requirements. The study was to be completed by October, 1976, in time for the formulation of the fiscal year 1978 request.

AEGIS and Its Platforms

In line with his emphasis on the continuing need for carriers, Rumsfeld also stressed the importance of the AEGIS air defense system and of its two alternative platforms, the strike cruiser (CSGN) and

4. For examples justifying the use of 30 years as a yardstick for carrier life-span, see the comments of Admiral Holloway, House Appropriations Committee, DoD Appropriations, fiscal year 1977, Hearings, Part 8, p. 212.

5. The Administration changed its position and ultimately requested carrier lead funds for fiscal year 1977, see below p. 37.

6. House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 1, p. 477.

guided-missile destroyer, DDG-47. AEGIS represents a major improvement in the intermediate, or "area," defense element of the defense-in-depth system that protects aircraft carriers. It is geared to defend against saturation attacks of the kind that are likely to take place when U.S. naval forces enter areas near the Soviet Union in order to project U.S. power ashore.

AEGIS actually is an integrated group of systems for tracking (SPY-1 radar), weapons direction (MK-12 system), launching (MK-99 launcher), and fire control and target illumination (MK-99 fire control system, MK-90/MK-91 radars). It utilizes the medium-range version of the Standard Missile 2 (SM2/ER). ^{7/} It also encompasses an operational readiness test system (ORTS) which monitors the system's readiness. ^{8/} The AEGIS system has good jamming resistance capability and can track and target more antiship missiles and/or planes simultaneously than any comparable system in existence or in development. Its integrated computer-linked network allows it to respond more quickly to detected targets than any other comparable system. Indeed, it is meant to be so highly integrated that it will be able to control the firing of Harpoon antiship missiles and antisubmarine rockets (ASROC), as well as of Standard Missiles. AEGIS thus provides a counter to the multiple air, surface, and subsurface threat to carrier task forces that the Soviets can mount.

7. The SM/2 is a "semiactive" missile. It relies on a radar "illuminator" to track the target and then receives the reflected signals which provide homing guidance.

8. Jane's Weapons Systems, 1976 provides a thorough description of the AEGIS system, SPY-1 radar, and SM-2 missile, from which these details have been excerpted.

The two warships that Rumsfeld envisaged as AEGIS platforms were meant to perform in a carrier escort role. Additionally, however, both were to have considerable offensive capabilities unmatched by other escorts presently in the fleet. The nuclear-powered strike cruiser (CSGN) would displace 17,000 tons and carry an eight-inch gun, the Harpoon missile, the Tomahawk long-range tactical cruise missile, and up to two V/STOL planes. Rumsfeld stated that it could "undertake crisis response and other operations in areas far from supply bases." ^{9/} The Navy later indicated that one prime area was the Indian Ocean. ^{10/} The second platform, somewhat smaller at about 9,000 tons, but still larger than any destroyer in the Navy, was to be a conventionally powered destroyer, (DDG-47). Its task was limited to carrier and other high-value escort duties. However, with Harpoon, two five-inch guns, and two helicopters, the DDG-47 would have as much or more offensive power than any ship other than the carrier and strike cruiser. The Administration argued that the high cost of these ships, particularly the strike cruiser (lead ship cost of 1,239 million in fiscal year 1977 dollars), militated against an all-nuclear AEGIS platform procurement program. It therefore requested \$858.5 million to fund a lead DDG-47, with advance funding for a lead CSGN, and the remaining funds to be requested in fiscal year 1978. ^{11/}

9. Rumsfeld, Annual DoD Report, Fiscal Year 1977, p. 166.

10. See, for example, the statement of Rear Admiral William L. Read, House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 4, p. 368, and the replies to Senator Culver's questions in Senate Armed Services Committee, Hearings on S. 2965, Part 5, 94-2, 1976, pp. 2642-2643.

11. Rumsfeld, Annual DoD Report, FY 1977, p. 166.

CONGRESSIONAL RESPONSES TO THE ADMINISTRATION REQUEST

The two Congressional Armed Services Committees responded to the Administration request in different ways. In March, 1976 the House Armed Services Committee anticipated the fiscal year 1978 carrier request, voting \$350 million in advance funding for the CVN-71, which it assumed would be a Nimitz-sized carrier. It based its rationale in part upon a Navy "CVNX" study which argued that the Nimitz, being a follow ship with almost no research and development costs, was the most cost/effective alternative for a buy of up to three carriers. 12/

The House committee also anticipated the Administration's strike cruiser program, voting advanced funding for three CSGNs instead of the Administration request for one. On the other hand, the committee saw no justification for the Administration's request for a nonnuclear AEGIS platform. The Committee felt that the DDG-47 was less capable than the CSGN and that given certain assumptions about strike cruiser recore costs and oil delivery costs, it was also less costly over its 30-year life cycle. The committee also concluded that the DDG-47 was too "vulnerable" to carry the AEGIS system, because it lacked the protective armor of the strike cruiser. 13/

12. House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 4, p. 278; see also House Armed Services Committee, Report together with Separate, Additional Dissenting and Individual Views (to accompany HR 12438), 94-2, 1976, p.29.

13. House Appropriations Committee, Report (to accompany H.R. 12438), Fiscal Year 1977, pp. 31-32. The House Armed Services Committee apparently assumed that the cost of procuring and maintaining oilers was part of the fuel delivery costs attributable to the DDG-47. It can be argued that, in fact, these costs should not be so attributed (CBO, U.S. Naval Force Alternatives, pp. 34-35). Additionally, the committee may have taken an optimistic view of the cost of nuclear fuel, possibly by assuming greater nuclear core longevity--hence lower recore costs--than the presently accepted core life span of 10-13 years (see Ibid.).

Lastly, the committee did not accept the President's justification for requesting a major conventional warship in spite of Title VIII of the 1974 Defense Authorization Act. 14/ To further show its interest in speeding the entry of AEGIS strike cruisers into the fleet, the committee voted \$371 million initial funds for converting the nuclear cruiser Long Beach into an AEGIS strike cruiser. 15/

By the time the Senate Armed Services Committee acted on the authorization request, the Administration had put forward (on May 4th) an amended Navy budget which called for the carrier advance funds which the House had already voted. The Senate Committee, however, initially denied the carrier funds, without prejudice to the long-term carrier program. It also denied the strike cruiser request, on the grounds that the concept had not passed initial Defense Systems Acquisition Review, and had not adequately been compared to possible alternative designs. The committee, therefore, voted to delete funds for that program. The committee was, however, in favor of bringing AEGIS into the fleet as soon as was possible and accordingly voted funds for procurement of the conventional DDG-47. 16/

The two committees voted in conference to fund the carrier long-lead items. They also voted to postpone a decision on either AEGIS platform until fiscal year 1978, without prejudice to the two concepts. AEGIS itself was not called into question, since the

14. This title of the act requires that all major warships be nuclear propelled unless the President determines that construction of nuclear-powered ships for this purpose is not in the national interest.

15. House Armed Services Committee, Report (to accompany H.R. 12438), Fiscal Year 1977, p. 32.

16. Senate Armed Services Committee, Report to Accompany H.R. 12438, Fiscal Year 1977, 94-2, 1976, pp. 57-58.

conference approved funding for the Long Beach conversion. 17/ The Conference decisions were reflected in the Defense Appropriations Bill that became law for fiscal year 1977.

The NSC Study

The process of formulating the fiscal year 1977 Navy budget was influenced by the NSC study which had been initiated in January, 1976. Although it was not completed by the time the appropriations bill became law, its preliminary results had already been publicized by mid-1976. The study seemed to recommend a course of action closer to that favored by the Senate Armed Services Committee. It called for only one more Nimitz-sized carrier, after which no more were likely to be built, as well as a mix of nuclear-powered strike cruisers and conventional DDG-47 ships to serve as AEGIS platforms. It also called for more lower cost, less capable warships like the FFG-7 class missile frigate. The Administration had originally requested eight of those ships, and the House had rejected that request, while the Senate approved it. It was on the basis of the NSC study that the Administration brought forward its request for carrier funding to fiscal year 1977, and increased its FFG request to twelve ships, though only eight were funded. 18/

TOWARD A MISSION-ORIENTED NAVY BUDGET

The differing Congressional reactions to the Administration's initial fiscal year 1977 Navy program request may, to some extent, have reflected differing views of the relative importance of the missions which the Navy might perform. The House preferred a program composed of larger, more capable, multipurpose warships. These would be able to support power projection against considerable odds. The Senate seemed more concerned with the Navy's ability to perform the sea control

17. Senate Armed Services Committee, Conference Report (to accompany H.R. 12438), FY 1977, p. 22.

18. Senate Armed Services Committee, Hearings on S. 2965, FY 1977, p. 7103.

mission in a European war. In its view the Navy program should emphasize a larger number of less expensive warships and fewer high-value units. The National Security Council likewise stressed the need for a larger number of warships in the fleet, and placed rather less emphasis than the House on the requirement for larger warships. It too appeared less concerned about power projection requirements in a European war than about the Navy's ability to perform the sea control mission in that context.

The following discussion will develop these mission-oriented approaches somewhat further, and will outline explicit force alternatives based on different concepts of mission priorities. It will emphasize alternative mission requirements primarily in the European context, since it is that scenario which continues to provide the dominant assumptions for sizing all U.S. forces. However, some consideration also will be given to requirements generated by contingencies not involving the USSR, to the degree that these requirements cannot be said to be included in NATO/European-oriented force sizing exercise.

A "SEA CONTROL" NAVY

It is possible to envisage a Navy that would be geared primarily to carrying out protection of the sealanes in a European war against the USSR. This Navy would emphasize lower cost systems to combat air, surface, and subsurface threats to convoys bringing men and materiel to Allies and overseas U.S. forces. It would have few high value units that might be more useful in a power projection role.

A "sea control" Navy could make its most significant contribution to a European war if that war were fought with conventional weapons, and if it lasted longer than a month. 19/ Such a longer war would call for providing

19. See above, pp. 4-7.

supplies and reinforcements to Europe. The convoys bringing these supplies would then require the defense that a "sea control" Navy could provide.

It could be argued that no further "Nimitz-class" carrier construction would be required for a "sea control" Navy that would have to defend against initial Soviet air and surface ship attacks and the persistent, longer-term submarine threat to shipping. As was noted above, interceptors based in Norway, Greenland, Iceland, and the United Kingdom could significantly reduce the Soviet air threat to convoys in the mid-Atlantic. Fewer carrier task forces than those presently required could probably cope with this diminished threat. Similarly, a lower carrier task force level could contain the Soviet surface ship threat. Soviet warships are unlikely to venture into the Atlantic without air cover, and that cover may be unavailable to them. Lastly, carriers are not cost/effective antisubmarine units. It is for that reason that the CVS antisubmarine program was discontinued.

A fleet geared primarily to the sea control mission likewise might not require the AEGIS air defense system and, therefore, either of its proposed naval platforms. This system is geared to defend against a coordinated Soviet saturation attack. But such an attack would be only likely to materialize if the U.S. Navy sought to project power against Soviet land targets. A "sea control" Navy would not attempt such a mission. As noted above, there is little prospect of a coordinated saturation attack against a fleet seeking to protect sealanes that are relatively remote from the Soviet Union. An advanced rapid reaction air defense system such as AEGIS may be superfluous to the defense requirements of such a fleet.

The present Navy program to upgrade the Terrier air defense system on twenty cruisers may contribute sufficient area air defense capabilities to support the in-depth defenses of the "sea control" Navy. The Terrier system will not be able to match AEGIS in

terms of automatic response, simultaneous tracking and targeting capability, or coordinated firing of systems other than its own missile. However, in its improved state, Terrier will include a more jamming-resistant version of its present radar and an Automatic Target Detection system to target and track over six targets simultaneously. It will utilize an improved, more jamming-resistant, version of the long-range Standard Missile (SM-2/ER). This missile will in fact be a longer-range version of the SM-2 missile to be installed as part of the AEGIS system. ^{20/} These characteristics could make Terrier an adequate air defense system for a fleet that is not likely to encounter high intensity air attacks. ^{21/}

Power Projection for the "Sea Control" Navy

A "sea control" Navy does not preclude projection as a naval mission. On the contrary, with a service life extension program, the Navy will have a force of 112 large-deck carriers until the late 1990s.

20. See Jane's Weapons Systems, 1976. See also statements of Rear Admiral Stanley Fine in House Appropriations Committee, Department of Defense Appropriations for FY 1977, Hearings, Part 5, 94-2, 1976, p. 1207.

21. There indeed is some doubt as to whether the Terrier system could effectively defend against cruise missiles fired from a single "Charlie"-class submarine. However, similar doubts apply to the AEGIS system as well. The effectiveness of both systems critically depends upon the distance from which the Charlie will commence firing. Present and projected sonar capabilities may not be sufficient to provide adequate assurance of detecting these submarines before they can fire missiles from distances close enough to offset the rapid-reaction advantage of the AEGIS system.

This force clearly represents a substantial overall fleet projection capability. It could be argued, however, that power projection for a "sea control" Navy only makes sense in contingencies where American naval activities will not elicit a high intensity saturation attack which may overpower presently available carrier forces. Such contingencies therefore would be limited to conflicts involving Third World states in which the USSR is not a participant. Present carrier force levels, and indeed lower levels, would support air power projection activities against Third World opposition. They also would support unopposed or, when feasible, lightly opposed landings in a European contingency.

Costs of a "Sea Control" Navy

The overall cost of a "sea control" Navy very much depends on assessments of its required size. However, large costs could be avoided by the decision to forego expensive units that may be viewed as more relevant to a power projection mission. Procurement costs of approximately \$1.44 billion (fiscal year 1977 dollars) and life cycle costs of \$13 billion could be avoided by a decision to forego the fourth Nimitz-class carrier. 22/ Table 3 illustrates the relationship of this decision to the scenario/mission rationale outlined above. Where the mission is solely one of sea control in a medium-threat North Atlantic environment and of power projection only in the face of minimal opposition, present, or perhaps

22. Although the Congress voted advanced funding for the fourth Nimitz carrier in fiscal year 1977, those funds could conceivably be transferred for the purchase of nuclear spare parts for other carriers, should there be a decision not to procure another Nimitz (see the remarks of Senator John Stennis, Congressional Record, August 9, 1976, p. S13928.)

Table 3. Force Alternatives -- Fiscal Years 1978-1983: Cost of Carrier Task Force Related Systems (Airwings Excluded) in Billions of Fiscal Year 1977 Dollars

Alternative	Mission/Scenario	Systems Procured	Single Unit Procurement Cost	5-Year Program Procurement Cost	Total 5-Year Procurement Cost ^a
Sea Control - Eur/USSR					
Sea Control	Sea Control and Projection	Third World	None	None	None
Power Projection	Sea Control and Projection	Eur/USSR and 3rd World			
			(3) CVN ----- \$ 1.44 (each) (6) CSGN/AEGIS ----- \$ 1.12 (lead) ----- \$.96 (follow) ----- \$ 5.92 ----- (3) Adv. Funding/ ----- CSGN/AEGIS ----- \$.30 ----- \$.30 ----- (14) DD-963 ----- \$.23 (each) ----- \$ 3.29 ----- 23 SHIPS (+ 3 Adv. Funding)		
	Total				\$13.82
43	NSC	Sea Control and Projection	Eur/USSR and 3rd World	(1) CVN ----- \$ 1.44 (2) CSGN/AEGIS ----- \$ 1.12 (lead) ----- \$.96 (follow) ----- \$ 2.08 ----- (8) DDG-47/AEGIS ----- \$.74 (lead) ----- \$.46 (follow) ----- \$ 3.96 ----- 11 SHIPS	\$ 7.48
	NSC Variant	Sea Control and Projection	Eur/USSR and 3rd World	(1) CVN ----- \$ 1.44 (4) AEGIS Backfit/ ----- CGN ----- \$.35 (each) (8) DDG-47 ----- \$.74 (lead) ----- \$.46 (follow) ----- \$ 3.96 ----- 9 SHIPS (+ 4 Backfit)	\$ 6.82

Sources for costs: CVN: procurement: HASC, Hearings on Military Posture, FY 1977, Part 4, p. 263 (figure inflated to FY 1977 dollars).

CVN: life cycle: CBO Estimate, based on figures in Ibid. and CVNX Characteristics Study.

CSGN,DDG-47: procurement: HASC, Hearings, FY 1977, p. 17 (figures deflated to FY 1977 dollars).

CSGN,DDG-47: life cycle: CBO Estimate, from various Navy sources.

DD-963: procurement: Derived from HASC, Report, FY 1977, p.33.

DD-963: life cycle: CBO Estimate, from various Navy sources.

AEGIS Backfit: see Text, p. and f.n.

a. Figures include fiscal year 1977 advance funding of \$ 0.35 billion for CVN-71.

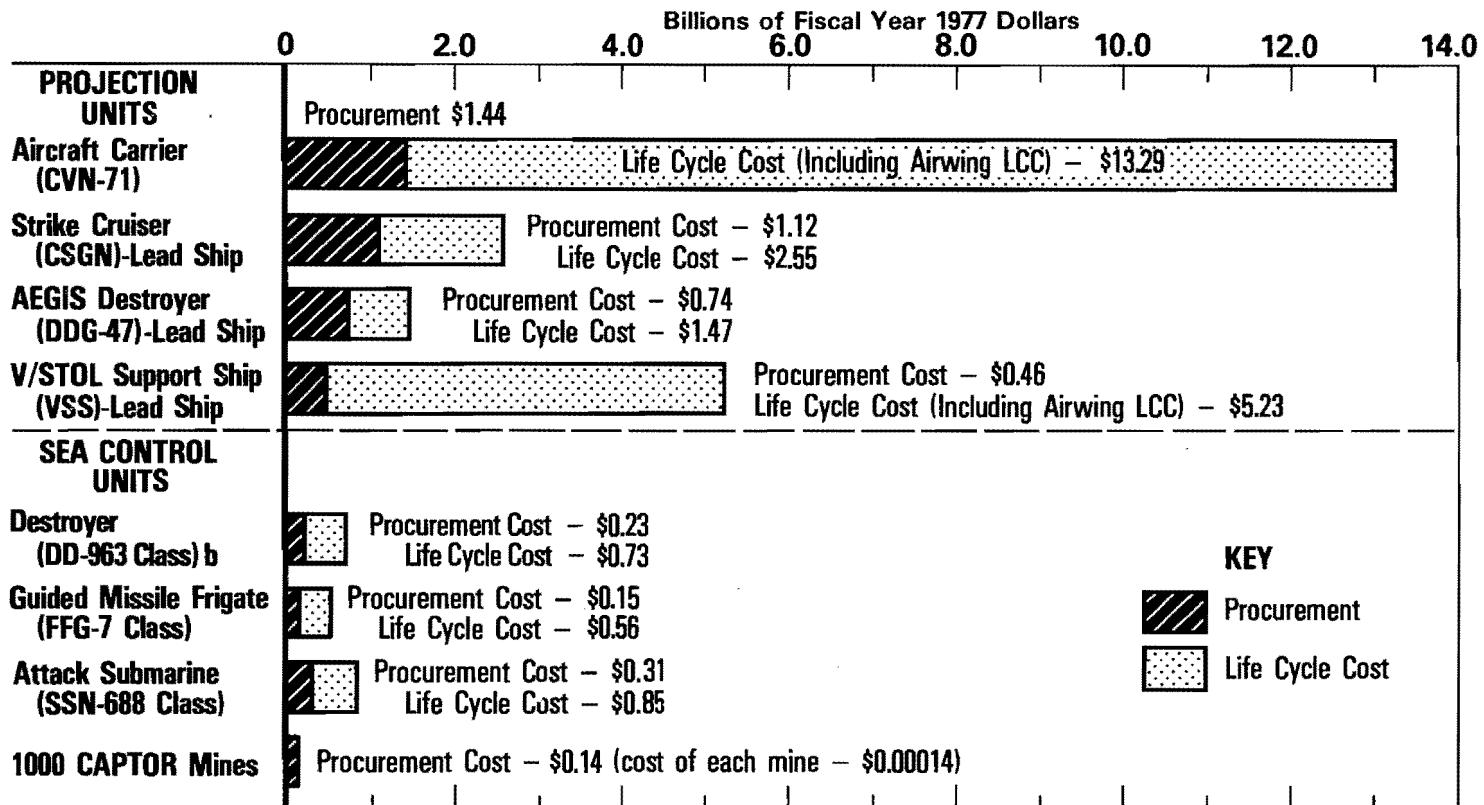
lower, carrier levels might suffice. There would be no need to acquire additional carriers on the margin, since are not optimized for sea control. Carriers already in the force would be utilized for this mission (in addition to projection in Third World contingencies) because they do have some capabilities that could contribute to its success. For similar reasons, there would be no expenditure on AEGIS platforms, whose lead ship procurement costs would be \$740.5 million for the conventionally powered DDG-47, and \$1.121 billion for the strike cruiser. ^{23/} Chart 1 illustrates some systems that primarily address the sea control mission as well as some others that can be more closely identified with

23. The cost of AEGIS installation is included in ship procurement. It amounts to \$117 million for either the CSGN or DDG-47 (House Appropriations Committee, DoD Appropriations Fiscal Year 1977, Hearings, Part 2, p. 135). The cost of installing three SPS-48C radars in fiscal year 1977 was \$2.1 million (Ibid., Part 5, p. 1207; also Navy information). The Terrier Program is an ongoing Navy program included in Other Procurement (OPN) accounts.

Total AEGIS ship procurement costs were based on the assumption that the Long Beach will receive the lead AEGIS system, which costs \$235 million (fiscal year 1977 dollars). No other AEGIS ships were approved in the fiscal year 1977 program. The cost of a lead AEGIS system was deducted from both the lead CSGN and lead DDG-47, with \$117 million (the follow-AEGIS procurement cost) then added to the remainder.

Chart 1.

Procurement and Life Cycle Costs: Illustrative Projection and Sea Control Systems



Sources: CVN-71 — Procurement: HASC, *Hearings on Military Posture, FY 1977*, Part 4, p. 263 (figure inflated to FY 1977 dollars).
 — Life Cycle: CBO estimate, based on *ibid.*, and *CVNX Characteristics Study* (Airwing Cost from *CVNX* study).

CSGN, DDG-47, FFG-7, SSN-688 — Procurement: *HASC Hearings, FY 1977*, p. 17 (figures deflated to FY 1977 dollars).
 — Life Cycle: CBO estimates, from various Navy sources.

VSS — Procurement and Life Cycle: CBO estimates, based on various Navy sources, VSS airwing comprises 20 AV 8B V/STOL planes and 15 LAMPS III ASW helicopters. Airwing life cycle cost includes training, AAI, and 6% annual peacetime (UE) attrition allowances.

DD-963 — Procurement: Based on figures in HASC, *Report accompanying HR 12438, FY 1977*, p.33.
 — Life Cycle: CBO estimates, from various Navy sources.

CAPTOR — Derived from figure for 480 mines in *HASC Hearings, FY 1977*, p. 444.

a. The Navy tends to view this ship as a sea control platform. See text.

b. Although included in the text as part of the projection Navy, the DD-963 is really a sea control oriented ship.

projection. 24/ The cost of a sea control-oriented program would depend upon decisions about the mix and number of these and other systems to be procured over the next five years. Such choices are the subject of considerable disagreement among naval experts and are beyond the scope of this study. Clearly, however, if the costs of the carrier and AEGIS ships were avoided and equivalent funds allocated in toto for procurement of sea control systems, a large number of the latter could be added to the Navy inventory.

A "POWER PROJECTION" NAVY

A "projection" Navy would be one that sought to contribute to the land battle in Europe in addition to its sea control responsibilities. In order to fulfill capably both missions, and regardless of whether "contribution to the land battle" signifies close air support along the German Central front or attacks on Soviet naval bases, this Navy would require a significant number of sophisticated, expensive, multipurpose ships.

24. As the note to Chart 1 indicates, the VSS could be considered either a sea control or projection platform. However, given the assumptions that underlie the sea control option, it is unlikely that the VSS could contribute any more significantly to the sea control mission than could the large-deck carrier, for which procurement has been ruled out. It is difficult to argue that VSS-based ASW planes are necessary if other ASW systems, particularly P-3s, are available. Thus, in this option, the VSS is best classified a projection ship, which may be desirable for Third World missions, but which is rendered unnecessary by present carrier force levels which, it is posited, are sufficient for these contingencies.

Like the "sea control" Navy, the "projection" Navy could only significantly contribute to the war effort if that war were fought with conventional arms. The war need not, however, be an extended one. Given sufficient offensive systems, the Navy could free some of its assets from sea control duties for immediate projection against Soviet land targets.

If the Navy were to project power in the face of strong Soviet opposition anywhere near the Soviet Union, and also seek to make the sealanes safe for convoys to Western Europe, it would require a larger aircraft carrier force than it has today. Carrier aircraft would be necessary not only for offensive strikes against Soviet targets, but also to defend the carrier task forces against large waves of cruise missile-carrying bombers, warships, submarines, and possibly small patrol craft. Given the need to perform sea control duties as well, the carriers would have to be of the large, multipurpose variety. Since the Nimitz is the most capable multipurpose carrier afloat, all new carriers would be of the Nimitz class.

Clearly, to achieve a significant capability to project power in Europe and/or against the Soviet Union, it would be necessary to build toward at least a 15-carrier force. If construction on a new carrier were authorized every two years, and the operating life of Forrestal carriers were extended, the five-year program for fiscal years 1978-82 would provide for a 14-carrier fleet.

It was noted earlier that attempts at power projection would likely provoke Soviet retaliation in the form of a saturation attack on carrier task forces. The very possibility of this attack on a "projection Navy" would demand procurement of the AEGIS system, which could provide the best available defense against it. The improved Terrier would be a useful supplement to carrier defenses but hardly the replacement for AEGIS.

Projection In Third World Contingencies

A Navy that could successfully project power against the Soviet Union clearly would have relatively little difficulty projecting power in Third World contingencies in which the USSR is not a combatant. However, it can be argued that carrier assets devoted to the former task should be diverted to the latter only when carrier-launched aviation is an absolute requirement for successful completion of the projection mission. In all other situations, given continued limited carrier assets, other power projection platforms might be desirable. The strike cruiser could fulfill this lesser projection role, while also serving as a major AEGIS escort. A "projection Navy" therefore, would probably call for strike cruisers rather than conventional destroyers as AEGIS platforms, so as to maximize the fleet's overall projection capabilities in a variety of scenarios. 25/

Cruiser and Destroyer Requirements for a Projection Navy

At least four nuclear-powered escorts are needed for each nuclear-powered carrier (CVN). With four such carriers already authorized, and three more proposed under the projection option, 28 escorts would be required for carriers approved by fiscal year 1982. Thus only fifteen nuclear escorts would be available to fill a requirement for 28. Three all-nuclear task forces could be formed, and the remaining task forces would have to combine cruisers and four destroyers per task force. There would be a requirement for 16 new DD-963 destroyers to complete the new task forces of the "projection" Navy.

25. The VSS (V/STOL ship) might be a more appropriate platform for the type of independent mission outlined above (see page 56). However, procuring a combination of VSS and DDG-47 ships in place of strike cruisers would mean that the Navy would forego its ability to mount a number of all-nuclear task forces. It might be argued that the sustained speed which nuclear power affords a task force is particularly appropriate to a "projection"-type Navy.

Cost of a "Projection" Navy

The total cost of a "power projection" Navy would depend on the total number of systems procured, which in turn may partly be limited by available shipyard capacity. If, however, it is assumed that the objective of advocates of a "projection" Navy does not materially differ from the position of the House Armed Services Committee, then a five-year construction program would include three carriers and up to six strike cruisers. The three-carrier level can be reached, because the Congress already voted advance funds for the first carrier, and the others could be built in alternate years, beginning in fiscal year 1978 (see Table 4). The strike cruiser level would be harder to achieve. The House voted funds to begin construction on three cruisers, apart from the Long Beach, but only Long Beach funding was approved. If advance funding were approved for three strike cruisers in fiscal year 1978, they could be fully funded in fiscal years 1979 and 1980 and the next set of three funded in fiscal years 1980-82. Long-lead funding for a third set of three would be provided in fiscal year 1982 (see Table 4). The remaining funds would be authorized in fiscal years 1983-84. Additional cruisers could be built if construction were undertaken in Navy yards. Fourteen DD-963 destroyers would be authorized to complete the new carrier task forces. To be sure, 16 are required, but destroyers can be built more quickly than cruisers, and the complete program can be spread over six fiscal years.

Chart 1 indicates that the cost of another Nimitz carrier is \$1.44 billion for procurement and \$13.28 billion over its 30-year active life, with air-wing cost included. A three-carrier buy, which would bring the total force to 14, would therefore amount to \$4.32 billion for procurement, and \$39.8 billion life-cycle costs, including air wing costs for each carrier.

Table 4. Alternative Shipbuilding Programs for Carriers, Cruisers, and Destroyers, Fiscal Years 1978-1982, in Billions of Dollars

Program	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980		Fiscal Year 1981		Fiscal Year 1982		Total Ships	Total
	No./Type	Cost										
Sea Control	--	--	--	--	--	--	--	--	--	--	--	--
Projection	1 CVN	\$1.09	1 CVN(adv.)	\$.36	1 CVN	\$1.08	1 CVN(adv.)	\$.36	1 CVN	\$1.08	3 CVN	\$ 3.97
	3 CSGN(adv.)	\$.30	2 CSGN	\$1.81	1 CSGN	\$.86	2 CSGN	\$1.72	1 CSGN	\$.86	6 CSGN	\$ 6.22
	4 DDG-963	\$.94	3 DD-963	\$.70	2 DD-963	\$.47	3 DD-963	\$.70	2 DD-963	\$.47	14 DD-963 ^a	\$ 3.28
Total	5 Ships	\$2.33	5 Ships	\$2.94	4 Ships	\$2.61	5 Ships	\$2.88	4 Ships	\$2.71	23 Ships	\$13.47
NSC Option	1 CVN	\$1.08	--	--	--	--	--	--	--	--	1 CVN	\$ 1.08
	1 CSGN(adv.)	\$.17	1 CSGN	\$.95	1 CSGN(adv.)	\$.07	1 CSGN(adv.)	\$.16	1 CSGN	\$.73	2 CSGN	\$ 2.08
	1 DDG-47	\$.74	--	--	2 DDG-47	\$.92	3 DDG-47	\$1.38	2 DDG-47	\$.92	8 DDG-47	\$ 3.96
Total	2 Ships	\$1.99	1 Ship	\$.95	2 Ships	\$.99	3 Ships	\$1.54	3 Ships	\$.165	11 Ships	\$ 7.12
NSC Variant	1 CVN	\$1.08	--	--	--	--	--	--	--	--	1 CVN	\$ 1.08
	1 AEGIS	--	3 AEGIS	--	--	--	--	--	--	--	4 AEGIS	\$ 1.40
	BACKFIT	\$.35	BACKFITS	\$1.05	--	--	--	--	--	--	8 DDG-47	\$ 3.96
	1 DDG-47	\$.74	--	--	2 DDG-47	\$.92	3 DDG-47	\$1.38	2 DDG-47	\$.92	9 Ships	\$ 6.44

Note: The cost of the Service Life Extension program for carriers (SLEP) has not been included in any option, because of present uncertainties regarding cost projections.

Note on Program Phasing: The flow of the "NSC Option" five-year program is virtually identical to that which the Administration put forward for fiscal years 1977-81. It reflects an effort to smooth the variations in annual shipbuilding authorizations. The "projection Navy" and "NSC Variant" programs represent a similar principle. Shipyard capacity also influenced the number of nuclear ships proposed for each year's construction program (see text). No such restrictions affected the choice of DD-963 numbers for ship construction. As many as six of these ships have been authorized for one year, to be built at one yard. The size of the annual DD-963 programs was instead geared to overall considerations of annual SCN cost variances.

a. Because DD-963 lead time is shorter than that of an aircraft carrier, 16 destroyers can be authorized over a six fiscal year period and be completed in time to commence active service with the three carriers authorized in the five-year period fiscal years 1978-82.

The total five-year procurement costs of carriers, AEGIS ships and DD-963s alone would total \$13.8 billion. Life-cycle costs (with air wing included) would exceed \$60 billion. The total \$13.8 billion five-year costs for the "projection" Navy's 23 major ships, outlined above and in Tables 3 and 4, comprise about 50 percent of the cost of the Administration's original \$28 billion, 111-ship construction program for fiscal years 1977-81. 26/ Nevertheless, they represent an optimistic forecast of the costs of a "projection" Navy option over the next five years. They are derived from Navy estimates of the cost of constructing follow-on ships at yards presently undertaking such work. In fact, Newport News is the only such yard presently constructing nuclear surface warships. Sufficient shipyard capacity must be made available in order to begin to build two or three additional nuclear ships a year for the next five fiscal years. This capacity potentially exists. 27/ To render it effective, however, the Navy may have to come to a costly settlement with the Newport News yard, which has threatened not to undertake any new construction until its claims of over \$894 million have been met. 28/ This settlement must then be added to the overall cost of the shipbuilding program. Additionally, Newport News could not by itself manage the entire nuclear shipbuilding requirement of the "projection" Navy. The Navy could construct ships in its own yards, but probably at greater cost. The Navy could also requalify certain private

26. Figures exclude cost growth, and are in fiscal year 1977 dollars.

27. CBO, U.S. Naval Force Alternatives, pp. 48-52.

28. Data presented by Admiral Frederick H. Michaelis to the Subcommittee on the DoD House Appropriations Committee, DoD Appropriations, Fiscal Year 1977, Hearings Part 8, pp. 235-36. See also p. 242, and report in Chicago Tribune, June 17, 1976, p. 11.

yards such as the General Dynamics yard at Quincy, which was once qualified to construct nuclear ships. 29/ Here, too, the costs of altering yard facilities and initiating new nuclear shipbuilding would increase the costs outlined in Tables 3 and 4.

The "power projection" Navy would have other procurement needs as well. Other systems, such as submarines for ASW and destroyers or frigates for convoy escorts and other duties, might also be included in the program. Total program costs therefore would also depend on the number and nature of additional systems included in fiscal years 1978-82 Navy budgets.

THE NSC OPTION

The National Security Council recently put forward a naval force option that falls somewhere between the "sea control" and "power projection" navies. Its program consists of a limited purchase of large multipurpose warships that are capable of power projection and of a substantial purchase of sea control-oriented platforms. It calls for but one more Nimitz-sized carrier, a mix of nuclear-powered and conventional AEGIS ships, and a large number of frigates and support ships for the sea control mission. The NSC has stressed that future carrier requirements should be met with V/STOL carriers, which may be less than half the size of the Nimitz but could presumably serve as both sea control and power projection units. 30/

29. CBO, Naval Force Alternatives., p. 49.

30. "United States Maritime Strategy and the Naval Shipbuilding Program," summary of tentative conclusions from NSC study, Department of Defense, August, 1976.

The premise underlying the NSC program seems to be that relatively small changes in the present major warship force are sufficient to permit the Navy to carry out both the sea control and projection missions as it has in the past, even in the context of a European war with the USSR. Preceding sections of this paper have sought to show that the nature of Soviet defenses, the constraints imposed by geography, and the prior demands of sea control all render projection in a European war an exceedingly difficult task. To project power successfully, the Navy would have to augment its forces considerably. This indeed is the course that the "power projection" Navy option follows. If the Navy does not do so, it might be better to deemphasize entirely the projection mission in Europe, and to utilize the fleet's limited projection forces for Third World contingencies. This, in essence, is the "sea control" Navy option.

Nevertheless, if it is assumed that the above obstacles to power projection are overstated, the NSC option does appear to have some merit. An additional argument in favor of this option would be that the nature of America's worldwide naval commitments may be expanding. There clearly may be a need for additional projection units for Indian Ocean and South Atlantic contingencies, though perhaps not to the degree set out in the "projection" Navy option. The NSC program of a Nimitz carrier and AEGIS ships accompanied by a V/STOL program might well meet this need.

The NSC option posits a 12-carrier force. Higher levels would not be required for power projection. This force would permit two carriers on station in the NATO theater, with a surge capability to five. These in fact are actual carrier deployments at the present time. They are meant to be sufficient for sea control tasks, with a residual power projection capability once the threat to the sealanes has diminished.

Carriers seeking to project power clearly would risk a saturation attack, but a task force equipped with AEGIS would reduce that threat considerably. Not all AEGIS ships would have to be strike cruisers, however. The primary function of AEGIS ships would be carrier defense. Only a small number would be strike cruisers, to provide for rapid-reaction, nuclear-powered task forces, and for some noncarrier projection capability for Third World contingencies.

Cost of the NSC Option

The five-year cost of the NSC option would be likely to exceed the President's original five-year request for fiscal years 1977-81 by as much as \$5 billion (fiscal year 1977 dollars), depending on what support ships are included in the program.^{31/} But none of that increase would be due to the procurement of additional high value ships. The proposed strike cruiser and DDG-47 purchases for the five years would remain at two and eight, respectively. Given Congressional inaction on either platform in its fiscal year 1977 debates, it is probable that two and eight would be the CSGN and DDG-47 numbers for the fiscal years 1978-82 program. The combined AEGIS ship procurement cost would total \$6.4 billion; the total life cycle cost would be \$12.3 billion. As noted above, the NSC does recommend that carrier procurement end with the fourth Nimitz carrier. The fifth such carrier, originally proposed for fiscal years 1980-81, thus drops out of the program, a cost avoidance of \$1.44 billion fiscal year 1977 dollars (and \$13.28 billion in ship and air wing life-cycle costs). All other changes to the President's original request involve FFG-7 anti-air frigates, and fleet support ships. The NSC

31. This estimate assumes 20 additional FFG-7s at \$146 million each, 14 additional support ships at an average of \$220 million, and 14 mine countermeasure craft at a cost of approximately \$25 million each, less \$1.44 billion for one carrier (all fiscal year 1977 dollars).

is thus recommending greater expenditure on sea control oriented platforms without too radical a change in the face of the multipurpose projection Navy. The carrier would remain the fleet's major offensive unit, with its force level stabilized at twelve.

A VARIANT OF THE NSC OPTION

Given its probable assumptions about required levels for successful power projection against Soviet land based targets, the NSC's program for a Nimitz carrier is an appropriate response to requirements. The NSC recommendation in favor of AEGIS likewise may be justified by the air defense requirements of the projection scenario. Some question exists, however, as to whether procurement of the strike cruiser is justified, even considering a projection requirement.

The strike cruiser's marginal utility to the fleet, relative to that of the DDG-47, is not significant in a European scenario. In that context, whether the mission is that of sea control or power projection, its defensive system is identical to that of the DDG-47. Offensively, its additional contribution is very much secondary to the carrier's air power. Its ability to deploy rapidly also is not critical to the European scenario, where combat distances for U.S. warships are short compared to transit distances in other parts of the world. Its independence of oilers is similarly not critical to the fleet's success in a European conflict. Even carrier replenishment requirements are not a function of propulsion in that environment. Lastly, its armor plating, which the DDG-47 does not have, would be insufficient to protect all parts of the ship against large warheads such as those of the Soviet SS-N-3 Shaddock missile. According to the Navy the strike cruiser's armor is sufficient to protect against random

shots or a missile similar to the U.S. Shrike. 32/ The Soviet Shaddock is approximately 65 times heavier than the Shrike. 33/

The CSGN's value lies only in the use to which its offensive capabilities might be put in an "independent" projection role in a Third World area, such as the Indian Ocean. A strike cruiser in this mission, however, clearly would not be utilizing the AEGIS system to its greatest effect. If indeed the threat were of a magnitude to require AEGIS protection, it no doubt would also require carrier air protection. If, however, the threat is not of the highest magnitude, there would be little threat to oilers as well, and the need for nuclear power would diminish. More importantly, the CSGN's mission in a low-threat Third World environment could better be carried out by the V/STOL ships that the NSC also is including in its program. With twenty V/STOL planes, even of the present AV8A variety, one of these ships would have longer range and more flexible firepower than the CSGN, which so far has been said to carry at best two V/STOL planes. To be sure, the cost of a V/STOL ship with its air wing certainly exceeds that of a CSGN. However, the CSGN's cost in turn far exceeds that of its conventional competitor, the DDG-47, even if fuel costs are taken into account. As Chart 2 indicates, a buy of 20 DDGs would yield savings of \$24.8 billion (fiscal year 1977 dollars). These savings would be more than enough to

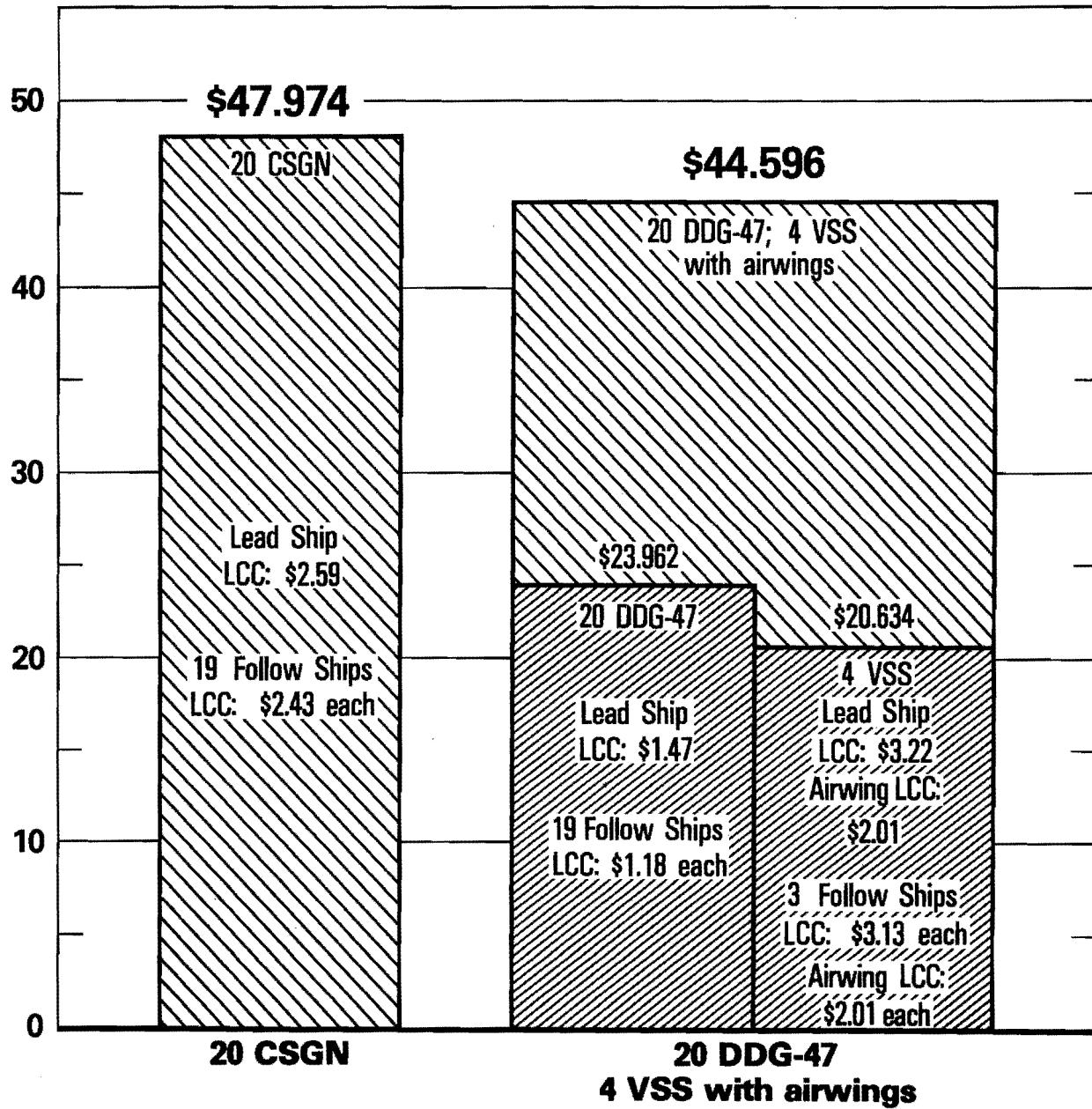
32. Testimony of Vice Admiral Robert C. Gooding, House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 4, p. 375.

33. The Shaddock weighs about 12,000 kg. (about 26,400 lbs.) (International Institute for Strategic Studies, Strategic Survey: 1975 (London: IISS, 1975), p. 23). Shrike weighs about 390 lb. (Jane's Weapons Systems, 1976). See also Admiral Gooding's Comments, House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 4, pp. 37, 40, 41.

Chart 2.

20 CSGN vs. 20 DDG-47 and 4 VSS Ships with Airwings: Life Cycle Cost (LCC) Comparison

Billions of Fiscal Year 1977 Dollars



Source: CBO estimates, based on various Navy sources. VSS airwing life cycle cost includes training, AAI, and 6% annual peacetime (UE) attrition allowances. CSGN does not include V/STOL plane costs.

cover the life-cycle cost of four V/STOL ships with their air wings. It should be noted that anything less than a 20-AEGIS ship buy would not really permit the independent use of CSGNs, since more than one would be needed for every carrier on station. 34/

A Different Nuclear Powered AEGIS Platform.

It was noted above that Congress voted fiscal year 1977 funds for conversion of the Long Beach nuclear cruiser into a strike cruiser. Additional nuclear powered strike cruisers could be obtained by backfitting AEGIS onto the Virginia-class cruiser. The cost of backfitting would be \$355.2 million (fiscal year 1977 dollars) each (see Table 4). 35/ Thus the cost of a strike cruiser (\$1,239 million lead, \$1,110 million follow, fiscal year 1977 dollars) is about equal to, or for a follow ship, less than the cost of procuring a DDG-47 (\$858.5 million lead, \$459 million follow) and backfitting AEGIS onto a Virginia-class cruiser. Admittedly, the backfitted cruiser will not match the offensive capabilities of the CSGN. However, as noted above, that capability is not critical for the AEGIS ship in

34. If it is assumed that there will be four carriers on station overseas and four in the U.S., 16 AEGIS ships will be needed to escort them. If it is further assumed that at least one of four AEGIS ships will be in overhaul at any given time, four more AEGIS ships will be required to ensure that the carriers always have their full complement of AEGIS escorts.

35. Navy testimony has indicated that the cost of backfitting AEGIS onto the Virginia-class cruisers would approximate \$400 million in fiscal year 1976 dollars for the lead ship (House Armed Services Committee, Hearings on Military Posture, FY 1977, Part 4, p. 356). In fact, the Long Beach will receive the lead AEGIS backfit. All Virginia-class backfits will therefore be follows-on. Assuming a lead ship factor of 1.25, the cost of each Virginia-class backfit will be \$355.2 million in fiscal year 1977 dollars.

its escort role, while other ships may more usefully perform "independent" missions. Additionally, the Virginia-class will have the Harpoon missile in canister launchers, giving it as much offensive capability as the DDG-47. Chart 3 indicates the comparative costs of lead and follow CSGNs against a combination of DDG-47 and backfitted Virginia-class cruisers.

CONCLUSION: TOWARD A MISSION-ORIENTED NAVY BUDGET

The Navy of today is one that revolves around a small number of very powerful carrier platforms that are capable of performing both the Navy's major missions of sea control and power projection. There are not many of these platforms because they are very costly and require up to eight years to build.

Achieving control of the seas in primarily a NATO-war context appears to be less demanding in terms of carrier and carrier escort requirements than is a scenario that also involves power projection against heavy Soviet opposition.

A "sea control" Navy that sought to project power only in low-threat Third World scenarios would not require further carrier construction until the 1990s. It could in fact shift the emphasis of the Navy from the carrier task force to sea control systems: convoy escorts, submarines, antisubmarine mines, land-based patrol aircraft and surveillance systems. Neither AEGIS, an air defense system geared to carrier protection in high-threat environments associated with the projection mission, nor its possible platforms, whether conventional or nuclear, would be required for this navy. The funds freed by the decision not to procure these major systems could be utilized to buy additional sea control systems. As Chart 1 indicates, these tend to be individually less expensive than projection-oriented warships.

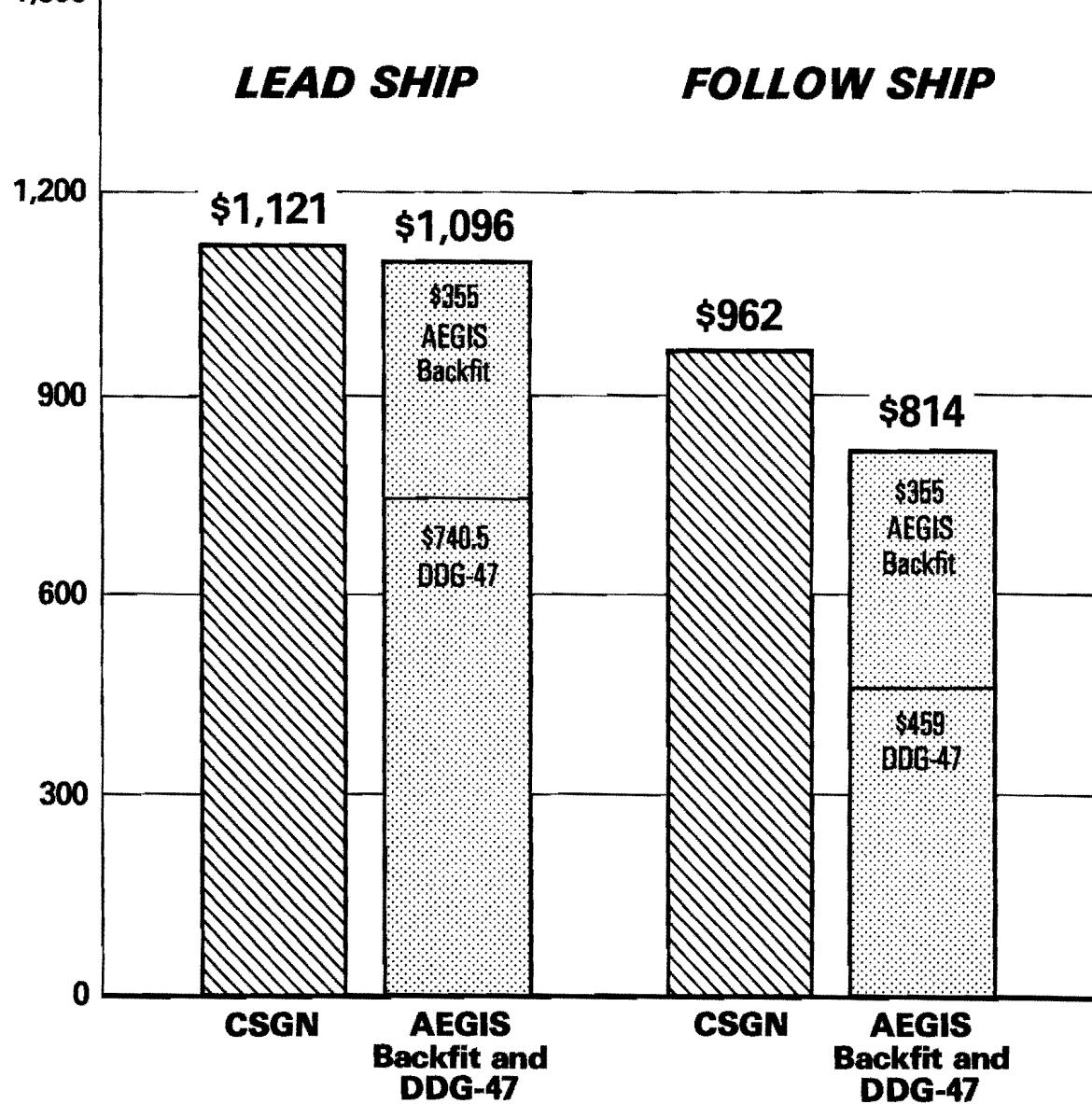
The demanding nature of the projection mission in the European theater would justify a significant increase in carrier procurement if a "power projection"

Chart 3.

CSGN Procurement Costs vs. DDG-47 Procurement Costs and AEGIS Backfit Costs: Comparative Lead and Follow Ship Costs

Millions of Fiscal Year 1977 Dollars

1,500



Sources: CSGN, DDG-47: HASC, *Hearings on Military Posture, FY 1977*, Part 4, p. 17.
AEGIS Backfit: See text, p. and footnote.

Navy were desired. Carriers would have to be procured at least every second year; AEGIS would be a necessary addition to task force defenses. Strike cruisers might usefully supplement the carrier's projection role in Third World scenarios, and would be procured as AEGIS platforms.

The cost of the projection Navy would be extremely high; its individual units are the most expensive in the conventional Navy. Unless Navy budgets expand considerably beyond present levels, it is unlikely that a significant number of sea control-oriented systems--such as frigates--could be procured at the same time as the Navy's projection warships. Most of the larger warships, therefore, would first have to serve as sea control platforms in any war that required the U.S. fleet to fight to protect sealanes to its Allies, although these ships are not optimal for this task. The "projection" Navy's contribution to the land battle, whether it would take the form of close air support or attacks on Soviet naval bases, would not reach full strength until the battle for free Allied transit of the sea lanes was well in hand.^{36/} The significance of that contribution would then depend on the state of the land battle during these later stages of conflict and the degree to which projection units survived the initial battle for control of the sealanes.

It may be argued that the demands of the projection mission have been overstated. If this is so, approximately present levels of Navy projection assets can accomplish that mission, even in proximity to the Soviet Union. This, in essence, is the fundamental assumption behind the NSC proposal for one more carrier and a mix of conventional and nuclear AEGIS platforms. Unless this assumption is accepted, the NSC proposal is not cost/effective, contributing only negligibly to the sea control mission, and hardly at all to that of power projection.

36. It should be recalled that projection is, in any event, a collateral Navy mission only. See above, p. 7.

In closing, it may well be worthwhile to recall the outline of assumptions about both missions that opened this paper. All force options primarily address a war in Europe against the Soviet Union. None of the force options assumes that the war at sea would be fought with nuclear weapons. Equally, none of the options presumes that either mission could be of primary value in a short European war. To be sure, if enough projection platforms were available, the Navy could seek to project all its air power against Soviet land forces at the outset of the conflict. However, in order to do so, it would have to forego a significant portion of its sea control capability, particularly with respect to defense against attack from surface ships and aircraft. Alternately, the Navy would require a carrier force of at least 15 active platforms, that being the number which Admiral Holloway has stated is a prerequisite for the Navy's successful pursuit of both its missions.^{37/} It should be noted, however, that even the "power projection" Navy option could not achieve that force level until the very late 1980s. Thus, for the next decade, the rationale behind both major Navy missions continues to be their relevance to a European scenario in which an extended war would be fought with conventional weapons. Any other scenario could seriously call into question both of these missions as well as the forces that relate to them.

37. Testimony of Admiral Holloway before the House Budget Committee, Task Force on National Security Programs, Hearings, Fiscal Year 1977 Defense Budget, 94-2, 1976, p. 408.

APPENDIX A**ALTERNATIVE PLATFORMS FOR THE
AIRCRAFT CARRIER**

The debate on the future of the aircraft carrier has taken two forms. One has revolved around the question of whether there is a requirement for additional carrier construction, and, if there is, how many carriers should be built. The second concerns the type of carriers that should be built if construction is deemed necessary. The first question is the more fundamental of the two. It requires answers which link national strategy and missions to force level requirements. Once it is clear that the nation's defense strategy in general and Navy missions in particular generate requirements for carriers, the second question becomes relevant and must also be addressed. The main text of this paper focused primarily on the first question, and examined several mission-oriented alternatives which demanded different carrier levels. However, it assumed in the context of relevant alternatives that if carriers were to be built at all, they would be Nimitz-type carriers. Thus it answered the question "if a carrier, what type should it be?" This appendix will address a series of alternative carrier types in order to outline the rationale for this paper's contention that "if a carrier is built, it should be Nimitz-type."

**BACKGROUND: CARRIER ALTERNATIVES AND THE 1977 FISCAL
YEAR DOD BUDGET**

When Secretary Rumsfeld outlined DoD's view of the need for additional carriers, he added that the Department was examining the possibility of constructing nuclear-powered 50,000 to 70,000 ton carriers 1/ and/or vertical/short takeoff and landing (V/STOL)

1. Rumsfeld, DoD Annual Report, Fiscal Year 1977, p. 164.

support ships 2/ in place of the Nimitz-size carrier. This examination actually had begun late in 1975, when then Secretary Schlesinger called for an examination of the cost/effectiveness of smaller nuclear carrier types versus the Nimitz. The Chief of Naval Operations interpreted the request to mean that the alternatives should be capable of operating "across the Navy's missions" as could the Nimitz. 3/ Moreover, the study group that was asked to undertake this examination in turn interpreted Admiral Holloway's remarks to mean that carrier alternatives should be able to operate equally well with respect to each mission in the same way as the Nimitz could carry out both sea control and power projection duties.

The CVNX study considered four types of nuclear-powered carriers: a 54,000 ton variant with two reactors (Type A), a 65,000 ton two-reactor variant (Type B), a 73,000 ton variant with four reactors (Type D), and a modified Nimitz-class carrier (Type N) (see Table A-1). 4/ The study measured effectiveness primarily in terms of the aircraft sorties that each alternative carrier could generate. It had found that all alternative types could be configured to match the Nimitz-class in antisubmarine warfare (ASW) effectiveness. It postulated two hypothetical scenarios--one calling for a sea control mission, the other for power projection--in which the comparative sortie rates were to be ascertained.

2. Ibid.

3. House Armed Services Committee, Hearings on Military Posture, Fiscal Year 1977, Part 4, p. 278.

4. A steam generator transfers heat from primary reactor cooling water to "feed water," which becomes steam that drives the ship's propulsion systems.

Table A-1. Alternative Carrier Designs

Type	Tonnage (Standard Displacement)	Range of Airwing	Propulsion (Reactors)
A	55,900	48-53	Nuclear (2)
B	65,300	59-65	Nuclear (2)
D	73,700	59-65	Nuclear (4)
N	81,600	89-94	Nuclear (4)

The sea control mission scenario was divided into two phases, one calling for antisubmarine and early warning barrier duty, the second consisting of antiship strike. The enemy threat consisted of coordinated strikes from missile-carrying air, surface, and subsurface combatants equipped with systems that would be operational by 1985. The study group found that the smaller carrier, with a notional wing of some 48 to 53 planes (about 54 percent of the Nimitz air wing), generated 53 percent of the sorties that the larger ship could sustain in a sea control mode. It argued that higher sortie rates led to reduced attrition, more timely air superiority, and more complete realization of strike objectives. 5/

The power projection scenario called for an attack on a "representative airfield ... consisting of the airfield, runways, fuel and ordnance storage, hangers and associated infrastructure." 6/ The threat consisted of enemy fighters and bombers operational by 1985, as well as of surface-to-air missiles and guns. A comparison of capabilities in this mode revealed that the performance of alternative carriers was even poorer when compared to the Nimitz than it had been in the sea control scenario. Again, the smaller carriers generated a fraction of the Nimitz' sorties; that fraction again corresponded roughly to the proportion of planes on the smaller ship relative to size of the Nimitz air wing. The smaller ships, when working in multiship groups, took far longer to achieve air superiority in the projection area. Attrition rates were much higher. Furthermore, the Nimitz was capable

5. Ibid., p. 316

6. Ibid.

of destroying far more targets than its smaller competitors. 7/ These comparisons led the study group to conclude that "the Nimitz size air wing with 89 to 94 aircraft is the best comparative balance of strike and ASW aircraft for sea control missions." 8/

Given the requirement regarding effectiveness set by the study group, the Nimitz class proved to be more cost/effective when up to three carriers were purchased. The Nimitz-type is essentially a follow ship to present Nimitz carriers. Research and development costs for modifying present Nimitz designs were assumed to amount to no more than \$10.5 million (fiscal year 1977 dollars). On the other hand, the smaller ships had much higher research and development costs which had to be offset before they became cost/effective. A purchase of three of the smallest alternative carriers (Type A), cost about 65 percent of an equivalent purchase of Nimitz carriers, but provided only 53 percent effectiveness for sea control and 51 percent for power projection. Purchase of at least three of the B and D types cost about 72 percent of the Nimitz, with about 65 percent effectiveness (see Tables A-2 and Charts A-1 and A-2). Indeed, similar cost percentages apply for purchase of six ships, 9/ while the effectiveness ratio remains unchanged (see Table A-2). 10/ The study group's recommendation was, therefore, for additional procurement of Nimitz carriers.

7. Ibid.

8. Ibid., p. 320.

9. This analysis looks at no more than six ships, since a six-ship procurement program would stretch at least until fiscal year 1987 for authorization, by which time a second look at carrier requirements would probably be in order.

10. A buy of nine Type A carriers, whose cost approximates a six-Nimitz buy, does not improve the cost/effectiveness superiority of the larger ship. See below, p. 73 and Table A-3.

Table A-2. Combat Effectiveness vs Cost: N Type Compared to Three Alternatives
in Billions of Fiscal Year 1977 Dollars

Type A vs Type N	Life Cycle Cost Ratio	Effectiveness (Air Combat Sortie Ratio)	Cost/Effectiveness Index ^a
Lead ship/airwing A	$\frac{N}{A} = \frac{13292}{9192} = 1.45$	$\frac{89}{40} = 2.23$	1.54
Six ships/airwings A	$\frac{N}{A} = \frac{79687}{52142} = 1.53$	$\frac{89}{40} = 2.23$	1.46
<u>Type B vs Type N</u>			
Lead ship/airwing B	$\frac{N}{B} = \frac{13292}{10537} = 1.26$	$\frac{89}{52} = 1.71$	1.36
Six ships/airwings B	$\frac{N}{B} = \frac{79687}{60172} = 1.32$	$\frac{89}{52} = 1.71$	1.29
<u>Type D vs Type N</u>			
Lead ship/airwing D	$\frac{N}{D} = \frac{13292}{10267} = 1.29$	$\frac{89}{52} = 1.71$	1.32
Six ships/airwings D	$\frac{N}{D} = \frac{79687}{60337} = 1.32$	$\frac{89}{52} = 1.71$	1.29

Sources: Costs: CBO estimates based on various Navy sources.

Effectiveness: Type A vs Type N, HASC, Hearings on Military Posture,
FY 1977, Part 5, p. 266.

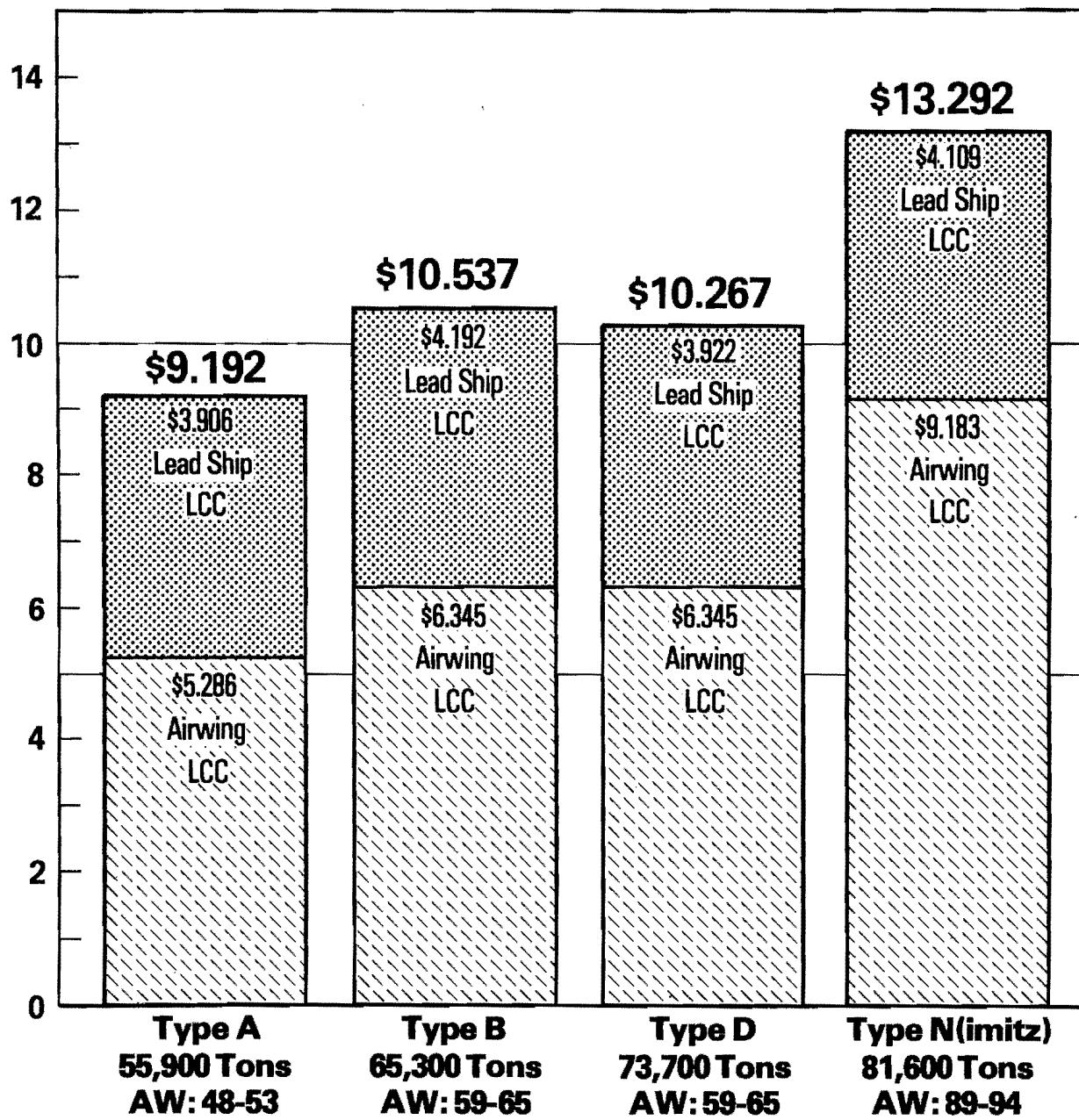
Types B, D vs N, Navy reply to CBO question, 14 September 1976.

a. The ratio is the quotient of the effectiveness ratio divided by the cost ratio.

Appendix Chart 1

Lead Ship and Airwing Life Cycle Costs (LCC): Nimitz and Three Alternative Carrier Types

Billions of Fiscal Year 1977 Dollars

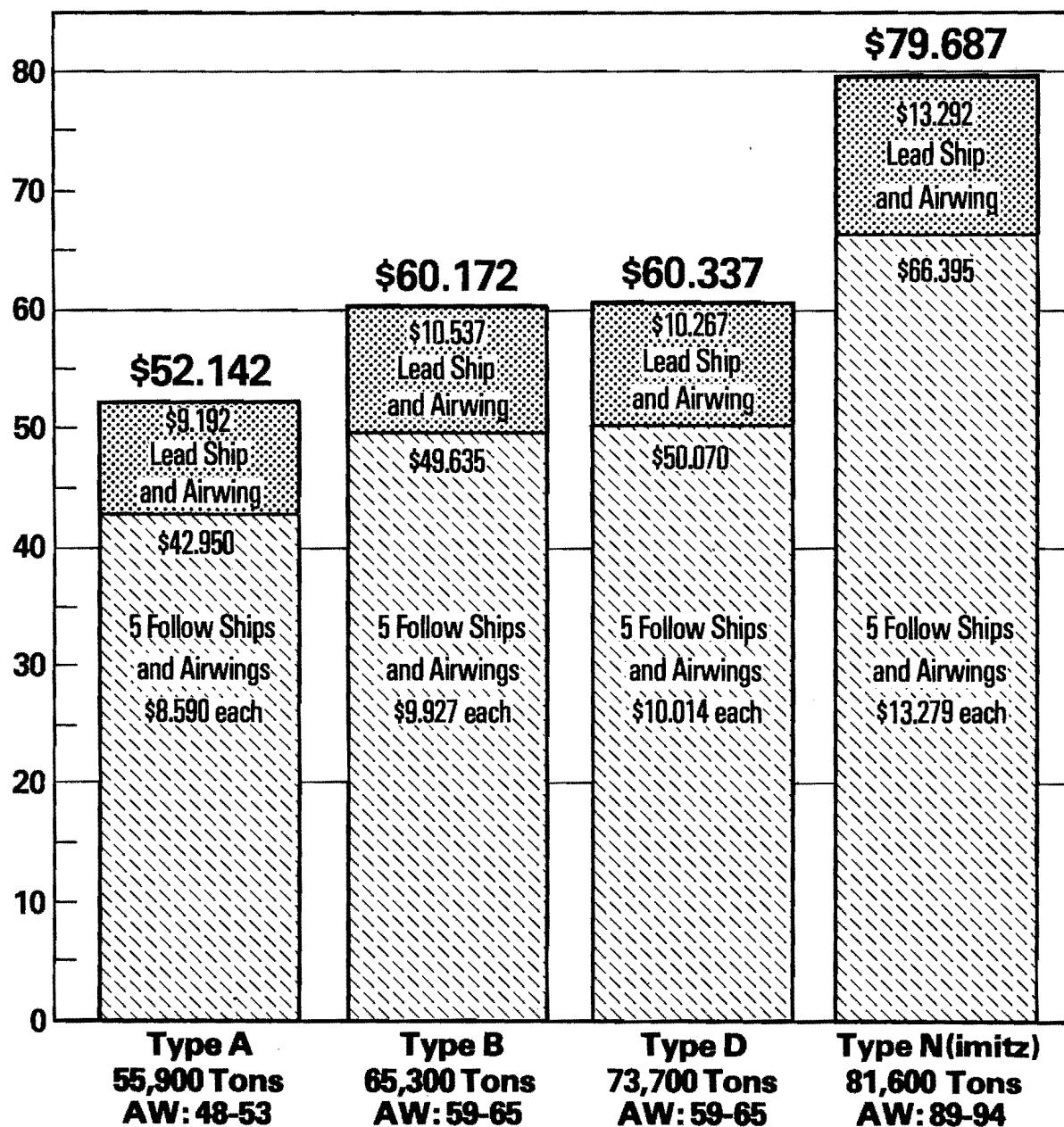


Source: Life Cycle: CBO estimate, based on *Hearings on Military Posture, FY 1977*, Part 4, p. 263 (figure inflated to FY 1977 dollars), and *CVNX Characteristics Study* (Airwing Cost from CVNX study).

Appendix Chart 2

Lead, Follow Ship and Airwing Life Cycle Costs (LCC): Six Ship Buy Nimitz and Alternative Carrier Types

Billions of Fiscal Year 1977 Dollars



The Navy initially produced the group's findings in its early hearings on the fiscal year 1977 Navy budget.^{11/} At this time the Navy was considering raising carrier force levels to 13. The appearance of the National Security Council's (NSC) tentative conclusions apparently brought to an end Administration proposals for increasing carrier force levels. The NSC recommended that it was "imperative" that initiatives in cruise missile and V/STOL technology be undertaken as soon as possible to supplement and replace large deck aircraft carriers.^{12/} Accompanying the report of its conclusions was the Administration's amended five-year shipbuilding program for fiscal years 1977-81, which provided for only one aircraft carrier instead of the two of the original request.^{13/} However, the NSC conclusions continued to reflect the study group findings in that the one additional carrier recommended for procurement in fiscal year 1978 was of the Nimitz type.

ALTERNATIVES TO THE NIMITZ: A QUESTION OF MISSION

Two major factors led the CVNX study group to conclude that the Nimitz was the most cost/effective carrier type. The first was the group's utilization of sortie rates as the primary measure of carrier effectiveness. The second was its assumption that the carrier would be subjected to--and have to defend against--a saturation attack while seeking to carry out either of its missions of sea control and power projection. Sortie rates are a measure of effectiveness that

11. Ibid., pp. 245-347.

12. "United States Maritime Strategy and the Naval Shipbuilding Program," August 1976, p. 7.

13. Ibid., p. 10.

are appropriate primarily to power projection. Land targets often require a number of attacks before they are destroyed, particularly if, like tanks, they are deployed in vast numbers.

Sortie rates do become important to the sea control mission if it is assumed that forces carrying out this mission will be subjected to a saturation attack. This, in fact, is the assumption that the CVNX study makes. Given a large number of enemy cruise missile-firing surface vessels and aircraft, as well as submarines, a requirement clearly exists to generate as many sorties as possible to defeat both the air and surface threats. (All carrier alternatives were assumed to have equal antisubmarine warfare capabilities.) The greater the reliance on sortie rates as a measure of effectiveness, the more telling the argument in favor of the warship that achieves the highest rates. That ship is the Nimitz.

Carriers in the "Sea Control" Navy

At first glance it would appear that the "sea control" Navy could do better with a smaller nuclear-powered carrier than with a Nimitz. Underlying the formulation of this alternative are assumptions that projection would not be attempted against the Soviet Union, and that an effective coordinated attack to saturate U.S. defenses is not likely to materialize either in the Mediterranean or below the line from Greenland to the United Kingdom. Under these assumption, sortie generation rates are no longer a critical factor, and smaller carriers may be cost/effective.

However, if these assumptions truly hold, no carrier is required, whatever its size. As was pointed out above, ^{14/} in the sea control environment, carriers that would be added to the fleet would in effect be utilized as antisubmarine (CVS) warships. Other ASW systems are more cost/effective than CVS. Therefore, under these assumptions, the optimal choice is not a smaller carrier, but no carrier at all.

14. Page 40.

The "sea control" Navy option, with power projection capability in the Third World, would be compatible with one type of "carrier" that the CVNX study did not consider: the conventionally powered V/STOL ship (VSS). Given a continuing requirement for some power projection capability in Third World contingencies, and a decline in carrier force levels that limit carrier presence, the VSS could fill a gap in U.S. naval capabilities. However, the VSS is not really a carrier substitute as presently conceived, and given present V/STOL technology, the VSS carries far fewer and less capable planes than the large-deck carrier. It also has none of the reconnaissance, support or suppression planes that form part of carrier wings, and are crucial to the success of high intensity engagements. Rather, VSS sortie capabilities are relevant to more limited Third World missions, akin to those envisaged for the strike cruiser for which it could indeed substitute. The carrier would still be required for major high-intensity contingencies that might arise in a Third World scenario. However, the "sea control" Navy will include an 11- or 12-carrier force well into the 1990s.^{15/} Given the other assumptions governing requirements for the "sea control" Navy, that force could provide carriers for these contingencies without straining carrier resources that are geared for a European contingency.

15. This assumes that the Navy will undertake a service life extension program (SLEP) for carriers, which will permit an 11-carrier force to function in the early 1980s and a 12-carrier force to operate thereafter until nearly the end of the century.

Carriers in the Projection Navy

The "small" carrier option is no more appropriate to the "projection" Navy than it is to Navy sea control; indeed it is less so. By definition, the "projection" Navy would call for maximum offensive capabilities and, in the case of the carrier, maximum sortie rates. These capabilities can best be provided by the largest carriers. As noted above, and in Table A-1, the Nimitz proves more cost/effective than any smaller nuclear type for purchases of as many as six carriers.

Buying a larger number of smaller carriers at equal cost in place of the larger ships, for example nine A-types instead of six Nimitz-class ships, would not affect the cost/effectiveness advantage of the latter (see Table A-3). Nor is it likely to affect overall carrier force survivability. To be sure, it is difficult to obtain any survivability measure. However, it is likely that the probability of each carrier's survival is the same whether six or nine carriers are involved; the events are independent of each other. Therefore, little is to be gained by buying a larger number of smaller carriers for the same cost as fewer larger ones.

A purchase of six Nimitz-type carriers would stretch to fiscal year 1987, well past the time frame of this paper. Thus, for the foreseeable future, if it is power projection that is desired, the Nimitz remains the best buy.

Carriers in the National Security Council Option

The NSC option apparently assumes that a level of twelve carriers allows for requisite projection in both Europe and the Third World. It also assumes that a saturation attack may take place even where the Navy is seeking to maintain free allied transit in the Atlantic and Mediterranean sealanes. Given these assumptions, carrier effectiveness again becomes a function of sortie generation capability. The Nimitz clearly is the more cost/effective option for a one-carrier purchase.

Table A-3. Combat Effectiveness vs. Cost: N vs. A Types
 Comparison at Equal Numbers and Equal Cost,
 in Billions of Fiscal Year 1977 Dollars

	Life Cycle Cost Ratio (N/A)	Effectiveness (Air Combat Sortie) Ratio (N/A)	Cost/Effectiveness Index (Eff. Ratio/LCC)
Equal Numbers: 6 Type A vs. 6 Type N	$\frac{79687}{52142} = 1.53$	$\frac{89}{40} = 2.23$	1.46
"Equal" Cost: 9 Type A vs. 6 Type N	$\frac{79687}{77912} = 1.02$	$\frac{178}{120} = \frac{89}{60} = 1.48$	1.45

As in the case of the "sea control" Navy, VSS ships could play an important role in the NSC option, and indeed do so. However, the observations made above about that ship apply to the NSC option: In its present conceptual form and technology state, the VSS is a good substitute for the strike cruiser, but not for a fixed-wing aircraft carrier.

GLOSSARY

AEGIS: An integrated, computer controlled air defense system, comprising a network of radars for tracking and targeting enemy projectiles, and associated missiles and missile launchers.

DEFENSE-IN-DEPTH: A concept of concentric carrier defenses comprising:

AIRBORNE DEFENSES: Interceptors which attack incoming raids hundreds of miles from the carrier.

AREA DEFENSES: Shipborne missile-firing systems that target missiles and planes that have survived interceptor attacks.

CLOSE-IN DEFENSES: Rapid firing guns or short-range missiles that are fired at all residual attacking units.

CARRIER TASK FORCE: A group of naval warships usually comprising an aircraft carrier, cruisers, and several additional destroyers. The cruisers and destroyers contribute to the defense of the carrier, primarily by means of their AREA DEFENSE systems, and antiship and antisubmarine weapons systems.

CHOKE POINT: A geographic bottleneck (e.g. straits), through which ships must pass to reach open oceans or seas. Ships passing through choke points are vulnerable to enemy attack.

ESCORTS: Naval vessels that are employed in the protection of ships they accompany. The protected ships may themselves be armed (e.g. carriers), or unarmed (merchant ships).

POWER PROJECTION: In naval terms, the launching of sea-based air and ground attacks against enemy targets on shore.

SEA CONTROL: Naval support of the relatively unimpeded transit of friendly shipping across selected sea lanes; denial of the enemy's ability to pursue similar operations in those areas.

STRIKE CRUISER: A 17,200-ton warship, propelled by nuclear power, armed with antiship, anti-air and antisubmarine systems and carrying two or more helicopters or vertical take-off and landing (VTOL) planes.

SUBMARINE BARRIER: A line (or lines) of attack submarines usually stretching across a CHOKEPOINT.

SURGE CAPABILITY: The ability to generate and sustain a higher than normal rate of military activity.

ABBREVIATIONS

Ship Symbols

CGN	Guided Missile Cruiser (nuclear powered)
CGSN	Guided Missile Strike Cruiser (nuclear powered)
CV	All-Purpose Aircraft Carrier
CVA	Attack Aircraft Carrier
CVN	All-purpose Aircraft Carrier (nuclear powered)
CVS	AntiSubmarine Aircraft Carrier
DDG	Guided Missile Destroyer
FFG	Guided Missile Frigate
SSBN	Fleet Ballistic Missile Submarine (nuclear powered)
SSN	Attack Submarine (nuclear powered)
VSS	Vertical/Short Take-Off and Landing Support Ship

Other Abbreviations

AV8	Vertical/Short Take-Off and Landing Attack Plane
SCN	Shipbuilding and Conversion (see note on page iv cover)
V/STOL	Vertical/Short Take-Off and Landing

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